RAILROAD GAZETTE

FRIDAY, NOVEMBER 20, 1896.

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Contributions.

Heat Test for Car Wheels.

Southern Pacific Company,
SACRAMENTO, Nov. 7, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the discussion relative to a heat test for car wheels: I have read with interest the editorial on the subject in your issue of Oct. 23, in which mention is made of the wheel tests made at Sacramento in 1892. I only wish to say that the experience of four years since these tests were made, and the new pattern of wheel adopted, fully corroborates the correctness of the change made. Since 1892 to Oct. 1, 1896, we have made at our wheel foundry at Sacramento 98,130 of the new pattern "JN" wheels, only 103 of which have failed on account of cracked plates, and I may say here that on this system car wheels are subjected to a more severe test in service than, probably, on any other line in this country, owing to the numerous heavy grades, the grade on one division being 2.2 per cent. continuous for about 80 miles.

I am inclined to the opinion that with a uniformly good quality of material used in wheel manufacture, and *proper form of pattern*, a heat test for continuous use is unnecessary. We now use practically the same quality of iron that we did with the old pattern, prior to 1892, and results have shown us that the benefits obtained are due almost wholly to the improved design of pattern, and proper distribution of metal in the wheel.

H. J. SMALL,
Superintendent Motive Power.

The Central London Railway.

London may be said to be without what is known in America as a rapid-transit system. It has no amount of track sufficient to deserve the name of a system laid out and worked for intramural traffic. The Metropolitan Railway, working 66 miles, and the Metropolitan District, operating 19 miles of railroad, do serve a great traffic within the limits of London and to and from suburbs, but they were not designed primarily for urban traffic, and for that and other reasons skirt, rather than pass through, the region of greatest circulation, leaving within the very irregular ellipse which they form a great area of very dense traffic served only by omnibuses and cabs.

The need of other and more direct lines has long been felt, and, according to the evidence given before a Parliamentary committee by Sir Benjamin Baker, "a line could hardly be drawn on a map for which a bill has not at some time or another been deposited." The need was especially felt of direct railroad communication between the west and the east, and several schemes have been projected to supply this want. The overhead railroad has always met an insuperable obstacle—the sentiment of the British public. [We may add also that it would be impossible to lay a line along straight and broad streets in London, and that consequently an elevated railroad would have to run through blocks of buildings or be intolerably crooked.—EDITOR.]

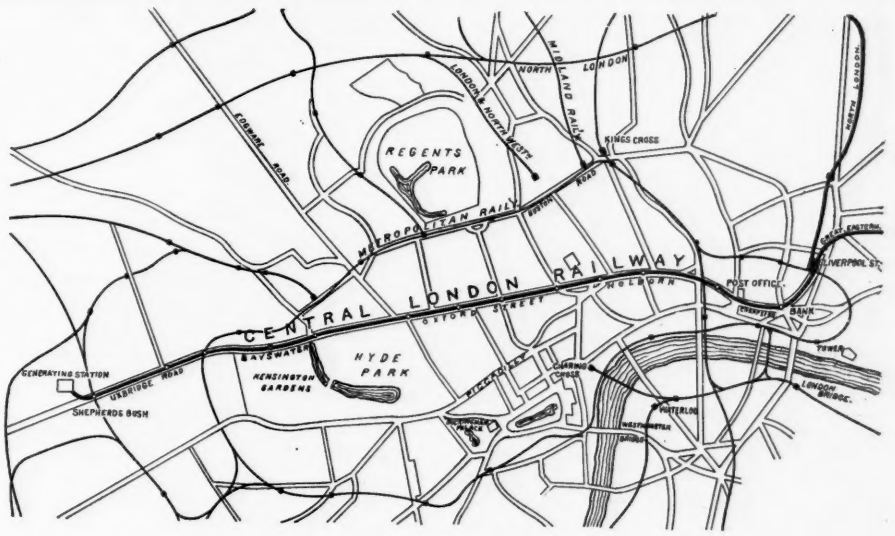
Attention was early turned to what have been called "tubular railways," the first of which was sanctioned by Parliament in 1865. This was to run from Waterloo, by Charing Cross, to London Bridge, and some wrought-iron tubes for it, 12 ft. in diameter and in 250-ft. lengths, were actually made before the undertaking was overwhelmed in the financial crisis of 1867. Of course steam was out of the question for hauling cars through a 12-ft. tube, and in the seventies the pneumatic system seemed to be the only practicable one. In the early eighties, however, cable traction had become well known in the United States, and electric motors were being tried experimentally there and in Berlin, and, naturally, these were suggested as suitable motive power for working tubular railroads beneath London if the tubes could be provided. But it was obvious that the construction of such ways by the cut and cover method was almost impracticable. Then the late Mr. J. H. Greathead came forward in advocacy of the use of the circular shield for driving tunnels to be lined with cast iron running at deep levels. [It is a mistake to suppose that Mr. Greathead was the originator of the circular shield system of tunneling. Nevertheless, for convenience we may as well accept the term "Greathead system" for that combination of the method of tunneling and the method of working which is exemplified in the City & South London Railway.—EDITOR.]

In 1884 Parliamentary sanction was obtained for what is now well known as the "City & South London Railway," but which at first bore the more modest title of the "City & Southwark Subway." The capital was soon afterward raised and the works commenced. In the session of 1890 a bill for a "Central London" tubular railway was deposited, with Sir John Fowler and Sir Benjamin Baker, united with Mr. Greathead, as its engineers. Parliament, nevertheless, refused to pass it until the City & South London had actually got to work, and it was not until the session of 1891—and then only in face of determined opposition—that the act was obtained. In 1892 further powers for a short extension eastward were obtained, and in this same session acts for no less than four other tubular schemes for London were passed. Of these new schemes, one—the Waterloo & City—being strongly backed by the London & South Western (from whose terminus at Waterloo it starts) was soon put under construction, and is now approaching completion; but two others—the Great Northern & City and the Hampstead & Charing Cross—failed in their appeals to the investing public, and, partly as a consequence of this, the flotation of Central London was postponed so long that in 1894 its promotors had to obtain a new act for extension of the time within which the line could be constructed. In the following year, however, the financial arrangements were completed, and in August this year the works were actually commenced.

The Central London undertaking was promoted by a syndicate of financiers, the leaders of whom were Messrs. Ernest Cassel and R. E. Farrant, of London; Mr. D. O Mills, of New York, and Mr. Hamilton Smith—also an American—who represented the "Exploration Company, Limited." This company exists partly to make profit out of the promotion of other companies and partly to find permanent investments for its shareholders (which include some of the highest financial names in London, Paris and New York), and as of the other members of the syndicate some, like Mr. Mills, were large capitalists, while others were speculators merely, there seem from the first to have been two interests at the back of the undertaking—the interest which sought only the flotation of it at a profit, and the interest which wished to go through with it as a permanent investment. In the proceedings for obtaining the Act the latter interest was kept well to the front; for, though the speculative promotion of ordinary companies is common enough in England, Parliament would not knowingly grant an act of incorporation to mere speculators; but afterward, naturally enough, the other element asserted itself, and the problem became how to float the concern as a thoroughly sound investment and yet at the same time to enable those who had advanced the expenses for obtaining the Act to reap a reasonable reward for the risk they had thus taken.

The solution hit upon was that the original promotors should form themselves into a subsidiary company under the name of the Electric Traction Company for the purpose of taking over a contract from the Central London Company to construct and equip the line, and that their places as directors of the latter should be taken by new men—men of the highest standing in the railway world—who should have no interest whatever in the Electric Traction Company. Accordingly a new Central London Board was formed, consisting of Mr. Henry Tennant, whose name more than any other is bound up with the prosperous career of the third largest British railway—the North Eastern; Lord Colville, of Culross, lately Chairman and still Director of the Great Northern; Lord Rathmore, Director of the London & North Western; Sir Francis Knollys, Director of the Great Eastern and Secretary to the Prince of Wales, and Hon. A. Mills, of the well-known banking firm of Glyn, Mills & Co.; and between these gentlemen and the Electric Traction Company a contract was negotiated, under which the latter undertook to acquire the necessary land (for stations, etc.), and to construct and equip the road with all its appurtenances, to the satisfaction of the Central London Company's engineers, for a lump sum of £3,244,000, payable £2,544,000 in cash and £700,000 in 4 per cent. debenture stock. As the capital authorized to be raised by the Central London Acts is £3,800,000, this bargain left the latter a good margin still available, and so it was able, under authority obtained from Parliament, to undertake to pay 3 per cent. interest out of capital during construction of the line. On these terms its open shares were issued without difficulty; indeed, a large part of them were taken up by the original promoters themselves, who, by thus acquiring a double interest in the concern, have given abundant evidence of their faith in its profitableness. The Electric Traction Company, in its turn, has sublet the works in three contracts.

When completed the Central London Railway will be 6½ miles in length; it will have 14 stations in all, and will connect the "City" and the "West End" of London by a line, which, with the exception of a few short curves of about four chains radius, will be practically straight from end to end. Its worst gradient against the load will be about 1 in 100; indeed, in respect of both gradients and curves it will be greatly superior to the pioneer line, the City & South London, which, having been laid out originally for cable traction, is neither so straight nor so level as it might otherwise have been made. As already inferred, there are to be separate tunnels for "up" and "down" traffic, and their diameter will be 11 ft. 6 in. as compared with 10 ft. 6 in. in the case of the City & South London and 12 ft. in that of the Waterloo & City. The tunnels are to follow the line of the streets for the whole distance, and their depth below the surface will vary from 60 to 100 ft.



Central London Railway—General Plan.

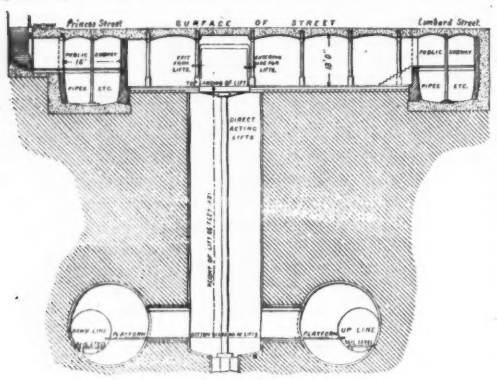
The City terminus is to be under the splendid terminal station of the Great Eastern at Liverpool street, with which it will be connected by lifts and subways, and it will have a similar connection, also, with the adjoining Broad Street Station of the North London Company, which serves also as a City terminus for London & North Western and Great Northern passengers. The next station—Bank Station it is to be called—is even more favorably located, for it is to be beneath the open space in front of the Royal Exchange, the very heart of the city, from which radiate all its great arteries of traffic. As a *quid pro quo* for the use of this open space—"which," in the words of Sir Benjamin Baker, "seems to have been specially reserved for some such arrangement by some far-seeing man"—the Central London Company has undertaken to construct immediately under the surface—far above its tunnels—a system of corridors for pedestrians, 15 ft. wide, accessible by stairs from each of the six street junctions, and these will serve the double purpose of providing an underground street crossing and of giving access to the station offices, which will stand in the center, as on an island, at a somewhat lower level than the corridors and connected with them by short flights of stairs. Close by, the City & Waterloo Company is making its terminus, and by arrangement with the Central London it is to have subway connection with the corridors, which, indeed, will form its only outlet to the streets; while near at hand there is to be a station on an extension of the City & South London line, the contract for which has quite recently been let. Thus this spot promises to become the center of a tubular system.

At its west end the line is to be carried rather beyond the urban area, in order to obtain more cheaply a suitable site for the generating depot.

The method of conveying the electrical power from

the generating depot to the motors will probably be as follows: Throughout the whole length of the two tunnels a copper cable will be laid. This will be the main conductor, and from it the current will pass to a working conductor, consisting of a bar of channel steel resting on blocks of glass fixed to the cross-sleepers between the rails. From this, of course, the motor will collect the current as it moves along. On the City & South London the connection between the main and working conductors is made through the signal boxes, and can be cut off there if the necessity arises for stopping a train summarily.

Each train is to consist of seven cars of the American type with end doors, mounted on bogies weighing about 12 tons, and accommodating 48 passengers. Thus the full seating accommodation per train will be 336 passengers. The interval between trains is not to be more, and will perhaps be less, than 2½ minutes, and it is calculated that at least 25 trains will be always in motion for 16 hours a day. The time to be taken for the whole journey of 6½ miles is estimated at 25 minutes, includ-

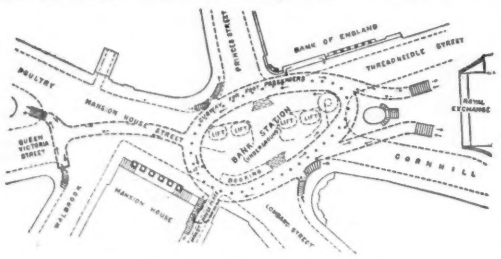


Section Through Lift—Bank Station.

ing stoppages—a speed about 30 per cent. higher than on the existing Metropolitan lines. The omnibuses which now ply over the route have been found to take, on an average, 1¼ hours to cover the whole distance. The cross-over from one tunnel to the other is to be made by "scissors" crossings beyond the terminus at Liverpool street, and in front of the terminus at Shepherd's Bush.

An important improvement which experience on the City & South London has suggested lies in the method proposed for constructing the stations. These on the South London were constructed of brickwork, or, more precisely, an iron tunnel of the same diameter as for the rest of the line was first driven and then a larger tunnel of brickwork substituted for it. In the course of this operation, however, some rather serious subsidences took place, 12 houses at various points and a church being damaged thereby; and so on the Central London the stations, as well as the rest of the line, are to be constructed by the shield system entirely, that is to say, the tunnels are to be of ironwork throughout, the diameter being widened to 21 ft. at the places where the stations are located. In this no difficulty is anticipated, seeing that at the present moment under the Thames a tunnel for street traffic of much larger diameter is being built by the shield system. The platforms, which are to be 325 ft. long, are to be placed on the inner side of each tunnel and will be connected in most cases by openings through the ironwork, thus forming practically a single "island" platform.

December, 1897, is the date by which the Electric Traction Company has contracted to finish the tunnels; the station buildings, lift, etc., will then remain to be constructed, and it is expected that the line will be opened for traffic by the end of 1898. So far as can be judged from very numerous borings, it is believed that a stratum of clay, practically impervious to water, underlies the whole route and consequently the delay and ex-



Plan of Subways at Bank Station.

pense of having to work under compressed air is not anticipated. As rapidly as the land can be acquired, shafts are being sunk at every one of the 14 stations, and day and night a small army of carts removes the spoil. There is practically no inconvenience to street traffic and except from the hoardings surrounding the station sites Londoners have, and will have, no physical indications that any new railway work is going forward. Any excavation of the roadway is absolutely prohibited under the company's charter and the whole work, therefore, must be done from the station sites. But in this there is no engineering difficulty; indeed, the Waterloo & City line, now nearly completed, has been excavated from a single shaft sunk at the south side of the Thames, beneath which river the line runs. A peculiarity of this latter undertaking is that, though 1½ miles in length, it is to have no intermediate station, its single object being to provide a rapid and frequent service of trains between the city and the London & South Western Company's terminus at Waterloo.

The maximum charging powers granted by Parliament to the Central London Company are 2d. per mile for passengers in first-class carriages, and 1d. per mile for second-class, *i. e.*, 1s. 2d. and 7d. respectively for the whole journey, but these powers are not in the least likely to be exercised; indeed, it is not at all certain that there will be any division into classes at all. On the City & South London there is no such division, but, on the other hand, the uniform charge of 2d. (or at the busiest hours 3d.) for any distance which is in force on that line does not seem very applicable to the Central London, which will compete for short distance traffic with omnibuses charging 1d. fares. In short, what will be the best method of charging on the new line is a somewhat complex question, and probably different methods will be tried before the best one is arrived at.

For one class of traffic, however, the powers of the company are specially and strictly limited. As a *quid pro quo* for the free use of the subsoil it is bound to provide three "workmen's trains" each way morning and evening, at a fare not exceeding 1d. for the whole or any part of the journey. At this rate, according to Sir B. Baker, it will pay a dock laborer earning 4d. an hour to live in the suburbs; and as in the neighborhood of the western terminus at Shepherd's Bush there is still a good deal of open ground, it will probably lead to a large workmen's colony being established somewhere in that quarter, unless—as seems not unlikely—all the available ground be first appropriated for building a better class of suburban residences. Anyhow the line will get a considerable amount of suburban traffic, and the company will probably be pressed very soon to extend it beyond Shepherd's Bush, perhaps as a surface line. If, however, it is the success it should be as a provider of urban rapid transit, it will probably not be worth its while to cater largely for suburban traffic.

C. H. GRINLING.

LONDON, Oct. 7, 1896.

Some of the Questions of Large Cars.

BY E. W. JUDD.

[*Concluded from page* 784.]

Suggestions of remedies for the existing evils that are in harmony with this principle are not altogether wanting. They afford good starting points for further investigations. To go no further than the printed pamphlet under review, several hints of possible reforms may be discovered. Mr. A. C. Bird makes the general remark that in his opinion "the only available remedy is a reconstruction of the classification," while Mr. A. E. Mitchell, Superintendent of Motive Power of the Erie, believes that "the only solution of the problem is to let the traffic department change their ratings in some way, so that the large-capacity car will not be in any more demand than the small-capacity car, so far as a shipment is concerned." These two officials, in other words, agree that the classification must be changed in some manner. With this for the first step, the next one is found in the recommendation that the change should be a radical reduction of the minimum weights, in order to make them correspond more closely with actual weights. Thus, the Committee of Mechanical Superintendents advises that the minimum weights be "fixed so that the modern car, as built and owned by the railroad companies, will have the same chance as the larger and weaker cars that railroad companies are asked to haul in their trains." This is somewhat indefinite. Not so the formal rule laid down by Mr. G. W. Rhodes, that "the minimum load must never be greater than the carrying capacity of the car." If this rule should be adopted it would require a multiplication of minimum weights, and a great reduction of them as relates to many articles, and might compel in some instances an advance in nominal charges, in order to keep the actual charges the same as at present; but at the same time it would apparently put small cars on an equality with large ones, so far as shippers are concerned, would abolish the present system of fines for the offering for transportation of bulky freight that cannot be loaded up to the appointed minimum weights, and would establish the just principle of basing charges for service upon service actually rendered. The question arises, however, whether the same result may not be reached in a simpler way.

The problem being how to reconstruct the classification, the transition, as a matter of theory, from a radical reduction of minimum weights to the abolition of them altogether is natural and easy. As a matter of practice also, this very change—this very revolution, if it be such—in railroad methods is urged by some eminently practical men as the only "effectual, satisfactory and lasting remedy for the difficulties of the situation." Thus, Mr. A. C. Bird, in connection with his general suggestion of "a reconstruction of the classification," as already quoted, advanced the particularly definite conclusion that "an article that cannot be loaded in an ordinary car to a reasonable minimum ought not to be given a carload rate." In other words, Mr. Bird would solve the problem of minima by abolishing minima. He would abolish carload ratings, so far as light, bulky merchandise is concerned, and would apparently substitute a uniform system of charges according to quantity, and, presumably, of charges per 100 pounds, regardless of quantity, as in the case of less than carload shipments. He makes, however, no specific recommendation to this effect.

Another suggestion of similar scope looks to the substitution of a system of charges according to actual space occupied. In the discussion before the New York Club a speaker pointed out that "the Sound boats load the freight by weight and by measurement. The receiving clerk has scales and a yard-stick, and he weighs the freight or he measures it, as the case may be."

Mr. E. Van Etten, General Superintendent of the New York Central & Hudson River, seems to have a scheme of this kind in mind. In his letter to the committee he said that as a rule he was opposed to the building of special cars for special kinds of freight, "believing that space should be charged for as well as weight." A more definite proposal of the same character was made by Mr. C. W. Bradley, General Superintendent of the West Shore. "I hope that this club," said Mr. Bradley, "will take strong ground, and will say to the traffic people that they must make their classification so that on these fragile and bulky articles the rate shall be per cubic foot without regard to weight. If the traffic people will make the tariffs on that basis you will hear no more about the question of cars larger than 60,000-lbs. capacity." Doubtless, however, Mr. Bradley is not sanguine enough to believe that "the traffic people" will at an early day substitute for the present system of tariffs based on weights a system based on measurements.

Returning, now, to the New York Committee's general principle, that a rate unit should be established that would make no discrimination between small and large capacity cars, and to Mr. Bird's conclusion, in harmony with this principle, that carload rates ought not to apply to commodities that "cannot be loaded in an ordinary car to a reasonable minimum," the pamphlet contains one definite and specific suggestion of a practical measure of reform that is in line with existing methods. This suggestion embodies the views of at least two eminent traffic men besides Mr. Bird, Mr. B. B. Mitchell, General Freight Traffic Manager of the Michigan Central, and Mr. Frank Harriott, General Freight Traffic Manager of the Erie. It is expressed by Mr. Mitchell in the pamphlet, page 33, as follows:

"The recent action of the Official Classification Committee in readjusting the minimum carload weights so as to remedy the situation in part, will no doubt do much to assist in the fairer distribution of cars, but the change is hardly radical enough. The only solution of the problem that I can suggest, and one that I very much favor, is to make a classification providing for rates in cents per 100 lbs., regardless of quantity, abolishing the carload rating, except on very heavy freight that can be loaded to 30,000 lbs. in a small car."

Writing elsewhere of this recommendation Mr. Mitchell says that his views on this question "seem to be a little more radical than those of most other railroad officials interested in the matter," and Mr. Harriott adds that, while his opinions coincide with Mr. Mitchell's, he does not think that either one of them is "ready to put such a radical measure in force." These authorities, in other words, agree with Mr. Wheatley's committee in the conclusion that "so many difficulties surround any radical change of the classification" that it will be necessary "to proceed slowly and gradually." The abolition of carload rates, even for those commodities the character of which is such that the system of minimum weights makes the actual rates very much higher than the nominal rates, would of course bring up new problems to be solved. The rival claims of wholesalers and jobbers, and of jobbers and retailers, would press more heavily than ever for adjustment. A considerable reconstruction of classifications and rearrangement of rates would doubtless be required. Nevertheless, this remedy for the prevailing evils would involve no new principles. Mr. Bird pointed out in his letter that it was not until the principle of charging so much per 100 lbs. actual weight had been long in force that the practice of applying carload rates based upon minimum weights was established and enlarged upon. To give up this practice would be, accordingly, to return to earlier and undisputed principles. The application to the existing situation of remedies of any kind will be a slow and difficult task. No better proof of this assertion is required than the fact that the carefully developed plan of a sliding scale of minimum weights, which appeals to the New York Railroad Club as a beneficent and practical measure, is "turned down" at once by the Official Classification Committee as too complicated and too expensive to be thought of, and altogether out of the question. Possibly, however, the remedy suggested by Messrs. Mitchell, Harriott and Bird may be found as easy of application as any, and, beyond a question, it would fill the requirements of the fundamental and axiomatic doctrine of the New York plan—the establishment of a rate unit for light and bulky articles that will make no discrimination between small and large capacity cars.

If Mr. Mitchell and those who agree with him should elaborate the grounds of their recommendation, their argument would probably be something like the following: The existence of a large-car question as a traffic question is due solely to the granting of carload rates. The withdrawal of car-load rates would settle the question once and for all—or, rather, it would eliminate the question altogether. With a uniform system of charges per 100 lbs. for light and bulky freight, regardless of quantity, as in former years, before carload rates were given, a car would be a car whether large or small. Small cars or large cars would be all the same to shippers. Railroad dividends are the result of small economies, and the economy or the consequent saving of

switching expenses, of empty-car mileage, of idle time of small cars, and of the construction of large cars purely in order to control traffic, would not be small; it would be very great. The only large-car problem remaining would be the mechanical or transportation problem—the problem involved in the adoption of that standard, or of those standards, of capacity that would give the highest possible ratio of live weight to dead weight, and would thus reduce the cost of transportation per ton mile to the minimum. With no traffic considerations to make the problem intricate, the operating and mechanical departments would have little difficulty in determining and establishing dimensions upon a purely scientific scale. Possibly, also, the present carload rates give the carriers less income from the kind of freight in question than they are justly entitled to. From all of these points of view—and, indeed, from every point of view—the return to the first principles of a 100-lb. basis exclusively would be well for the carriers.

From the point of view of the public, moreover, the abolition of carload ratings for the merchandise in question would have certain advantages. Perhaps these advantages would more than counterbalance the apparent disadvantages. The opposite conclusion, at all events, should not be asserted without careful consideration. In the transportation system of the present day the principal mischief is not excessive charges, but uncertain and discriminating charges. Most of the efforts of the Interstate Commerce Commission and of similar bodies are directed toward the attainment not of lower rates, but of uniformity and publicity in rates Discrimination, not extortion, is the evil to be corrected. If it should be granted that the abolition of carload ratings would raise rates in certain instances to some extent, it would raise them alike to all shippers, putting shippers in large cars and in small ones on an equality; enabling shippers to calculate in advance, as they cannot do now, what the cost of transportation would be; making the published classifications and tariffs a known and not an unknown quantity; and putting an end to the intolerable discriminations between communities and individuals that are inseparable from the carload system, with cars of varying capacities, notwithstanding all that has been done by fair-minded officials and by legislatures to prevent discriminations.

Moreover, the apparent increase in rates, if any, would be offset to some extent in that freight not carried would no longer be charged for, as it is now charged for, in those numerous instances in which the minimum weights of the classification are in excess of actual weights. Carload rates, again, do not exist by divine right. They were established by the carriers for certain equitable purposes, and may be modified or withdrawn for similar purposes. The rule that commodities which cannot be loaded in ordinary cars to a reasonable minimum ought not to be given carload rates cannot be considered inequitable. If the withdrawal of carload ratings for such commodities should work to the disadvantage of large shippers, it would, *pari passu*, work to the advantage of small ones, and public policy demands that the latter rather than the former should be favored, if either. That the transportation companies should help the big manufacturers or the big merchants to crowd out the little ones is not for the public interest.

Mr. Mitchell and those who believe with him would doubtless argue further, in conclusion, that no change in established rates or classifications can ever be made without compelling a readjustment of business conditions. Every proposed innovation affecting the charges to be paid by the public for the transportation of merchandise, as well as the revenue to be received by the carriers for the transportation service, ought to be carefully considered, that no injustice may be done to any interest. Carload ratings, therefore, should not be abolished without prudent consideration. The abolition of them as regards light, bulky freight, however, would not be so radical a change as it might seem to be at first thought, and no other solution of the large-car problem promises to be so simple, so just or so beneficial.

The Gould Vestibule Platform Buffer and Tender Coupler.

Observing the value of the vestibules between coaches, mail and baggage cars to prevent telescoping in case of collision, the postal authorities have recommended that vestibules be applied to the tenders of locomotives to protect the front end of the first mail car. It is evident that between the tender and mail car there is the greatest danger of telescoping and only with a vestibule here can a train be truly called "solid vestibule." For these reasons, Mr. James McNaughton, Superintendent of Motive Power and Cars of the Wisconsin Central Lines, has applied the Gould vestibule, platform buffer and tender coupler to his engine tenders, and the accompanying illustration is from a photograph of one of these tenders.

The construction, in addition to the standard vestibule, consists of a wooden upright sub-frame held in malleable iron pockets, which are bolted to the end sill of the tender. The top of the wooden sub-frame is braced by half-inch plates, one on each side, joined to the frame by angles. The bottom ends of the plates are attached to the top plate of the tank by angles, either bolts or rivets being used. These half-inch plates are cut out to go over the top flange of the tank.

The wooden sub-frame and iron braces form a strong construction which is covered over with sheet-iron. The sheet-iron extends around the sides of the sub-frame to the back end of the tank, and also over the tops of the plate braces, covering all open spaces. The frame covering does not interfere with the tank manhole, and the slanting cover is made somewhat oval and tapering so that snow will not bank up on the back covering.

The standard vestibule is hung from the sub-frame, and there is no change in the Gould standard tender buffer, excepting that a long buffer plate is applied to accommodate the vestibule face plate.

The vestibule, with buffer and coupler, is being applied by the Gould Coupler Company to tenders differing widely in construction, with a view to using only standard parts which can readily be duplicated.

Gould Tender Vestibule.

Train Accidents in the United States in October.

COLLISIONS.

REAR.

1st, on Burlington & Missouri River, at Pluma, S. Dak., a freight train ran into the rear of a preceding freight which was standing at the station. A car repairer riding on a hand-car attached to the rear of the second train was injured.

2d, on Great Northern, near Cedar Lake, Minn., a westbound freight train descending a grade broke in two, and the rear portion afterward ran into the forward one, derailing several cars, one of which fell upon the eastbound track; a moment afterward an eastbound passenger train ran into the wreck, and the engine and four second-class sleeping-cars were badly damaged, although the three baggage cars ahead of the sleepers were not much damaged The engineman was killed and 4 passengers were injured.

3d, on Philadelphia & Reading, at Locustdale, Pa., a freight train descending a grade broke in two, and the rear portion afterward ran into the forward one, damaging 16 cars. A man stealing a ride was injured.

3d, on Delaware, Lackawanna & Western, at Stroudsburg, Pa., a freight train ran into the rear of a preceding freight; conductor killed.

6th, 4 a. m., on Pennsylvania road, at Donohue's, Pa., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking 14 cars. Two tramps were killed and a third tramp and a brakeman were fatally injured.

6th, on Missouri, Kansas & Texas, near Fort Worth, Tex., a freight train broke in two and the rear portion afterward ran into the forward one, the collision occurring on a bridge. One span of the bridge was knocked down and 7 cars and the caboose fell into the Trinity River. Three trainmen were injured.

6th, on Atchison, Topeka & Santa Fe, near Ardmore, I. T., a fast freight ran into the rear of a preceding mixed train, making a bad wreck; the passenger car and two or three freight cars took fire and were burned up. The engineman and fireman were injured.

7th, 7 a. m., on Atchison, Topeka & Santa Fe, at Argentine, Kan., an eastbound freight train which had been unexpectedly stopped as it was entering the yard was run into at the rear by a following freight, wrecking one engine and several cars.

A few minutes afterward passenger train No. 8 ran into the rear of the second freight train, and

A few minutes later passenger train No. 2 ran into the rear cars of No. 8. A live-stock drover and 2 other passengers, one fireman and a porter were injured. There was a dense fog at the time.

7th, 11 p. m., on Philadelphia & Reading, near Reading, Pa., a freight train descending a grade broke in two, and the rear portion afterward ran into the forward one, wrecking 7 loaded cars. A tramp was injured.

24th, 5 a. m., on Pennsylvania road, at Wall, Pa., an empty engine, running backward, ran into the rear of a preceding freight, wrecking the caboose and killing the conductor. The engine ran past a fixed signal which was in the danger position.

28th, on Illinois Central, at Tangipahoa, La., a passenger train ran into the rear of a preceding freight; engineman and fireman injured.

30th, on Pennsylvania road, near Ardara, Pa., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking 4 cars. A brakeman was injured.

30th, on Pennsylvania road, at Sharpsburg, Pa., a passenger train ran over a misplaced switch and into some freight cars standing on a sidetrack, badly damaging the engine and 3 cars. Several passengers were injured.

30th, 9 p. m., on Pennsylvania road, at Whitford, Pa., a passenger train ran into the rear of a preceding freight, wrecking the caboose and killing a drover. A brakeman was injured.

And 19 others on 13 roads, involving 5 passenger and 22 freight and other trains.

BUTTING.

1st, 1 a. m., on Baltimore & Ohio, at Philson, Pa., eastbound freight train 74 descending a steep grade became uncontrollable and collided with westbound freight No. 95, making a very bad wreck, four engines and 56 loaded cars being wrecked. Two trainmen were injured and 3 tramps were killed and 4 injured. The first 17 cars of the train had air-brakes, and the trainmen say that they were properly coupled and tested at Sand Patch, but on passing the summit the engineman discovered, though too late, that the valve was closed between the tender and the first car. The trainmen tell a thrilling story of this wreck. The train left Sand Patch shortly after midnight. Sixteen cars next to the engine were equipped with air-brakes. Before starting into the tunnel, at the summit, which is a mile in length, the hand-brakes on three cars on the rear end were set. Two more were set after the brakemen noticed that the train was getting beyond control. By the time the east end of the tunnel had been reached, the heavily loaded cars had attained such frightful velocity that it was impossible to check their speed on the wet rails. The brakemen and Conductor Harbaugh clung to the tops of the cars, making their way toward the rear end on all fours. Seeing that it was impossible to save the train. Flagman Geiger cut off the caboose two miles west of Bowman. Conductor Harbaugh and Brakeman Mickey uncoupled the three cars next to the caboose and stopped them. Brakeman Cornell stuck to his post on the front end of the train untill the light in his lantern went out. Then he went back over the train with Fireman Owens. The collision came before they had gone two car lengths.

Engineer Zane hung to the steps of his engine for four miles. He said after the wreck that he had fully made up his mind to jump at Bowman Station, but his heart failed him, and he climbed back into the cab, resigned to meet what he thought was certain death. Bowman was the passing point for train 74 with westbound train 95. Engineer Zane knew that he was sure to crash into the ponderous engine hauling No. 95 up the mountain within a few seconds, and he hung to the whistle-lever until he saw the glimmer of its headlight. He scrambled over the tender and reached the first box car before the two engines came together. He knew nothing after this until Friday morning. Brakeman Cornell and Fireman Owens were likewise hurled from the top of a car over a hill to the left of the track. Both were severely cut and bruised, but managed to get among the wrecked cars first and help out the injured.

The force of the collision sent the eastbound engine plowing through the westbound train a distance of 300 yards. The wreckage was piled into a miniature mountain, and the track for 300 yards was torn as if dynamite had been exploded every foot of the way.

Engineer George Kauffman, of No. 95, jumped as soon as he saw the headlight of the other engine. . . . Immediately following the collision was an explosion. Several cars on train 74 were loaded with flour. The supposition is that it was the flour dust that exploded. The report awoke the residents of Philson Station and sent up a cloud of milky whiteness.

The cries of the injured tramps attracted the attention of the trainmen as soon as they regained their presence of mind, and the work of rescue began. A large number of these gentry were beating their way over the mountain on train 74. There were about fifteen of them in a box car about the middle of the train.

2d, 1 a. m., on New York, New Haven & Hartford, at Fall River, Mass., butting collision between a passenger train and a freight in a tunnel, badly damaging both engines; one fireman injured.

6th, on Southern Pacific, at Greene, Or., butting collision between empty engines; one fireman and one brakeman killed and four other trainmen injured. It is said that a telegraphic order was misunderstood.

8th, 2 a. m., on Southern Pacific, near Palo Alto, Cal., a freight train collided with some freight cars which escaped from a sidetrack and ran some distance on the main track, making a bad wreck. The engineman was killed and two brakemen and a fireman injured, the latter fatally.

14th, 3 a. m., on Florida Central & Peninsular, about 1½ miles south of Swansea, S. C., butting collision of passenger trains, wrecking and overturning the baggage and mail cars, which caught fire from an overturned stove in the mail car and were burned up. Two trainmen and a mail agent were pinned down in the wreck and were burned to death. The engineman of the southbound train misread a telegraphic order, reading Sweeden for Swansea. The conductor noticed that the engineman did not shut off steam, and tried to stop the train at Swansea, but the other train was met before he succeeded in doing so.

14th, on New Orleans & Northeastern, near Mitchell, Miss., butting collision of freight trains, wrecking both engines and 10 cars. The wreck took fire and most of it was burned up. The engineman and fireman of the northbound train were killed. It is said that the northbound train disregarded a telegraphic order.

15th, on Wisconsin Central, at Waupaca, Wis., a northbound freight train standing at the station was run into by a southbound gravel train, doing slight damage. The freight was in three parts; just before the collision the engineman of the freight reversed his engine, put on steam and jumped off, and the whole train ran back unattended about 2½ miles, although the brake on the caboose was set and one pair of wheels was off the rails.

18th, on Southern Pacific, near Orange, Tex., butting collision of freight trains, both running at high speed, making a very bad wreck. A man in charge of horses was killed and one of the enginemen was injured.

19th, on Grand Trunk, near Berlin, N. H., butting collision of freight trains, wrecking 12 cars; one brakeman injured.

24th, on Southern Pacific, near Alpine, Tex., butting collision between a passenger train and a freight; both enginemen injured.

25th, on St. Louis & San Francisco, near Windsor Springs, Mo., butting collision of passenger trains, wrecking both engines and the foremost cars of both trains. Two trainmen and 7 passengers were killed and 3 trainmen and 6 passengers were injured. The engineman of the westbound train (second No. 1), who should have cleared the track for the eastbound (No. 12), forgot about the latter. He was about 45 minutes late. No. 1, when on time, passes Valley Park before No. 12, starting from there, is made up.

25th, on Atchison, Topeka & Santa Fe, near Arkansas City, Kan., butting collision between a passenger train and a freight, injuring a brakeman.

28th, 5 a. m., on Philadelphia & Reading, near Cordelia, Pa., butting collision of freight trains, wrecking both engines; one fireman injured.

And 6 others on 4 roads, involving 4 passengers and 7 freight and other trains.

CROSSING AND MISCELLANEOUS.

2d, 2 a. m., on Chicago, Burlington & Quincy, at Krum, Ia., a passenger train backing out of a side track collided with a freight train, and the Superintendent's car at the rear end was overturned. A brakeman was killed.

5th, on Lehigh Valley, near Hazelton, Pa., the cars of a passenger train train ran into the engine, which had just been run on to another track, but had not fully cleared the main line, doing considerable damage. Four passengers and one trainman were injured.

9th, on Northern Pacific, at Bozeman, Mont., a part of a freigh ttrain left standing on the main track and held only by air-brakes, the hand-brakes not being set, started down grade uncontrolled and ran into the engine of the train, doing considerable damage. The engineman was badly injured.

10th, on Louisville & Nashville, at Grace's, Ala., a passenger train passing from the branch to the main line was run into by a freight; both engines damaged. One passenger jumped off and was injured.

11th, on Baltimore & Ohio, near Dickerson, Md., the caboose and one car of a freight train ascending a grade broke away and ran down the hill; the caboose was in some way detached from the freight car and ran some distance ahead of it, but it soon reached a level place and the car ran into it, wrecking both. A brakeman in the caboose was killed.

12th, on Southern Railway, near Birmingham, Ala., collision between a passenger train and a freight; engineman and fireman injured. There was a dense fog at the time.

29th, on Cincinnati, Hamilton & Dayton, near Wapakoneta, O., a freight train collided with three cars of oil belonging to a preceding freight which was switching on the main track, and the engine, the oil cars and one loaded freight car were wrecked and burned up. The engineman was killed and a tramp was injured. The flagman did not go back far enough and did not give an effective signal.

And 11 others on 11 roads, involving 5 passenger and 16 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

1st, 7 p. m., on New York, New Haven & Hartford, near Dartmouth street, Boston, an eastbound passenger train approaching the crossing of the Boston & Albany ran through an open derailing switch, the engine and one car being thrown off. The signals on the Boston & Albany had been cleared and those for the New Haven train were at danger, but, just before this train came up, the red glass in the semaphore was broken out by a stone thrown by a boy, so that the signal showed white, indicating all clear.

7th, on Great Northern, near Beulah, Mont., a mixed train was derailed at a switch, which had become unfastened by the loosening of a bolt; 2 passengers injured.

23d, on Denver & Rio Grande, at Saperino, Col., a freight train broke through a burning bridge and several cars were wrecked. The wrecked cars took fire and were consumed, and a brakeman was burned to death.

27th, on Oregon Railway & Navigation Company's road, near Wallula, Wash., a freight train was derailed and the engine and 9 cars were ditched. The fireman and one brakeman were killed and the engineman was injured. It is said that the derailment was due to a broken rail.

And 1 other, involving 1 freight train.

DEFECTS OF EQUIPMENT.

2d, on Yazoo & Mississippi Valley, near Cannonsburg, Miss., the caboose of a freight train was derailed, by the breaking of a drawbar, and fell down a bank. A brakeman was killed and his body, pinned down beneath the caboose, was burned up, fire having started from a lamp.

4th, on Atchison, Topeka & Santa Fe, near Peterton, Kan., the engine of a passenger train was wrecked by an explosion of its firebox, and the engineman and fireman were killed; the train, which was running at good speed, was derailed and several cars wrecked, and four tramps were killed. Two tramps were injured.

10th, on Baltimore & Ohio, near Paw Paw, W. Va., 2 cars in a freight train were derailed by a drawbar which was pulled out and fell upon the track; one tramp killed.

9th, on Cleveland, Cincinnati, Chicago & St. Louis, near Larue, O., a brakebeam of an empty platform car, in the middle of a long westbound freight train, fell upon the track and tore up a crossing plank. This plank was carried along about nine miles when it dropped off and derailed one truck; this truck ran on the sleepers for about half a mile and then ran off clear of the track, the train going on. At the same time that this truck jumped the track one truck of the next following car also went off, and this one ran on the sleepers about 2,000 ft. farther than the other; then it got back on the track and behaved all right. After running about six miles farther the trainmen noticed that they had lost a truck and stopped the train.

25th, on Norfolk & Western, near Zuni, Va., a freight train wes derailed by the breaking of an axle and 12 cars fell down a bank. A brakeman was killed.

28th, on Central Washington Railroad, near Reardan, Wash., the engine of a freight train was derailed by the breaking of a flange and the engineman was injured.

And 14 others on 10 roads, involving 14 freight trains.

NEGLIGENCE IN OPERATING.

27th, 12:12 a. m., on New York, New Haven & Hartford, at South Norwalk, Conn., an eastbound passenger train past a distant and a home signal both at danger and was thrown off the track at a derailing switch, the engine falling down a bank.

30th, on Boston & Maine, near Lynn, Mass., a passenger train ran upon a drawbridge when the draw was partly open and the engine fell into the water. The engineman and fireman jumped into the river and were injured. The engineman failed to control the train by means of the air-brakes and the cars were saved by the application of the hand-brakes.

And 4 others on 4 roads, involving 4 freight trains.

UNFORESEEN OBSTRUCTIONS.

4th, on Philadelphia & Reading, near Fleetwood, Pa., a freight train was derailed at a switch and 9 cars were wrecked. It is said that the switch had been tampered with.

5th, on Baltimore & Ohio, near Magnolia, W. Va., a freight train was derailed by a landslide and the fireman was injured.

8th, 6 a. m., on Baltimore & Potomac, at Alexandria, Va., the engine of a freight train ran into an electric street car on a crossing; the street car was wrecked and the engine and one of its cars were derailed and damaged. The motorman was killed. There were no passengers in the street car.

9th, on Terre Haute & Indianapolis, near Arcola, Ill., a freight train was derailed by running over some horses and the engine and several cars were ditched. The engineman was injured.

13th, on Buffalo Creek Railroad, in Buffalo, N. Y., 10 cars of oil in a freight train were derailed at a half-thrown switch, and every car was broken sufficiently to let all its contents out; and a ditch 5 ft. deep adjoining the track was filled with oil. The city police carefully guarded the oil from fire until the next day, and nearly half of it was saved; that is, 24,502 gal. out of 55,774 gal. The switch had been opened by a boy.

20th, on Kansas City, Ft. Scott & Memphis, near Springfield, Mo., a passenger train was derailed by a malicious obstruction and the fireman was slightly injured.

28th, on Bradford, Bordell & Kinzua, near Smethport, Pa., a passenger train was derailed by a misplaced switch and 2 cars were overturned. The fireman was badly injured. It is said that the switch had been maliciously misplaced and spiked.

And 2 others on 2 roads, involving 2 freight trains.

UNEXPLAINED.

14th, on Northern Central, near Hollins, Md., a car in a gravel train was derailed and 6 employees were injured.

17th, on Cleveland, Cincinnati, Chicago & St. Louis, near Wellington, O., a freight train was derailed and 25 cars were wrecked.

18th, on Boston & Maine, near Wentworth, N. H., a freight train was derailed and a brakeman was killed.

20th, 1 a. m., on Chicago Great Western, near Parnell, Mo., a car in a freight train was derailed near a bridge, and, running upon the bridge with the wheels off the rails, it was the cause of the derailment of 12 others, which, with the caboose, fell into the stream. The conductor and 2 tramps were killed.

26th, on Chesapeake & Nashville, near Bransford, Tenn., a mail car in a passenger train was derailed and overturned; several passengers injured.

26th, on Houston & Texas Central, near Courtney, Tex., the tender of the engine of a passenger train was derailed, and with the engine was overturned. The fireman was killed and the engineman injured.

And 16 others on 11 roads, involving 1 passenger train and 15 freight and other trains.

OTHER ACCIDENTS.

7th, on New York, New Haven & Hartford, at Meriden, Conn., the engine of a freight train was wrecked by the explosion of its boiler, some of the fragments being thrown half a mile. Many windows were broken. The engineman and fireman were injured, but not very badly, the force of the explosion being mostly forward.

And 6 others on 6 roads, involving 6 passenger trains.

A summary will be found in another column.

New 60-Ft. Postal Cars for the St. Louis, Iron Mountain & Southern Railway.

We show by the accompanying engravings, drawings of the new 60-ft. postal cars recently built for the St. Louis, Iron Mountain & Southern, by the St. Charles Car Company, St. Charles, Mo., from designs furnished by the mechanical department of the Missouri Pacific. Three cars have been built from these plans and delivered.

Fig. 1 is an elevation of one of the cars showing the framing. The underframe is of oak timber, the end sills being 8 in. × 12 in., side sills 6 in. × 8 in., center, intermediate and outer intermediate sills 4½ in. × 8 in. The bridging is 3 in. × 8 in. Above the floor the frame-

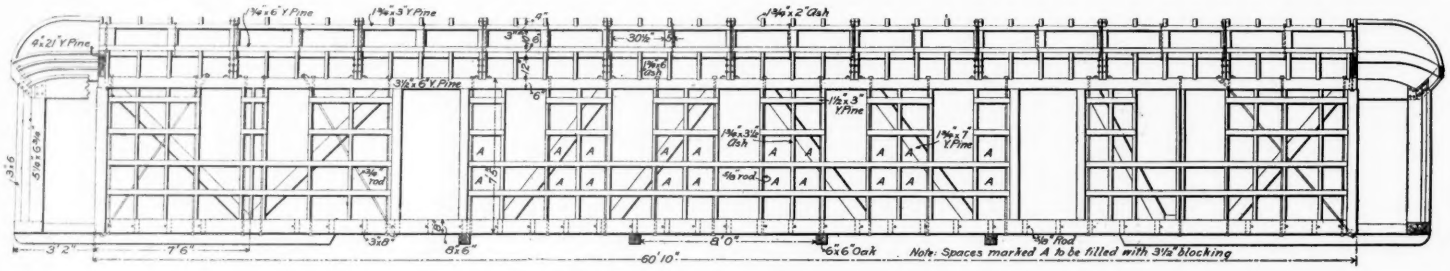


Fig. 1.—Elevation of Postal Car—St. Louis, Iron Mountain & Southern Railway.

work is built of yellow pine and ash. The platform timbers are all ironed their full length with ⅜-in. × 6-in. wrought-iron plates. All sills are plated 18 ft. back from the end sills and flanged on the end sills with ⅜-in. × 8-in. wrought iron. For protection in case of derailment or collision, the end sills are plated on the bottom with wrought iron, ½ in. × 12 in. The body bolsters are made of 1 in. × 6 in. iron and the center and side bearings are of wrought iron.

The following are the principal dimensions:

Length over drawbars	69 ft. 6 in.
" from out to out of vestibules	67 " 2 "
" outside of panels	60 " 10 "
" inside " "	60 " 0 "
Width outside " "	10 " 1 "
" inside " "	9 " 3 "
Extreme height from top of rail	14 " 1 "
Height inside car	9 " 4 "
Weight	87,670 lbs.

Fig. 2 is a plan showing the inside arrangement of the car. One of the novel features is the complete enclosure of the platform with the Gould vestibule attached, thus making room on the platform space for the storage of mail.

The cars are provided with the safety system of steam

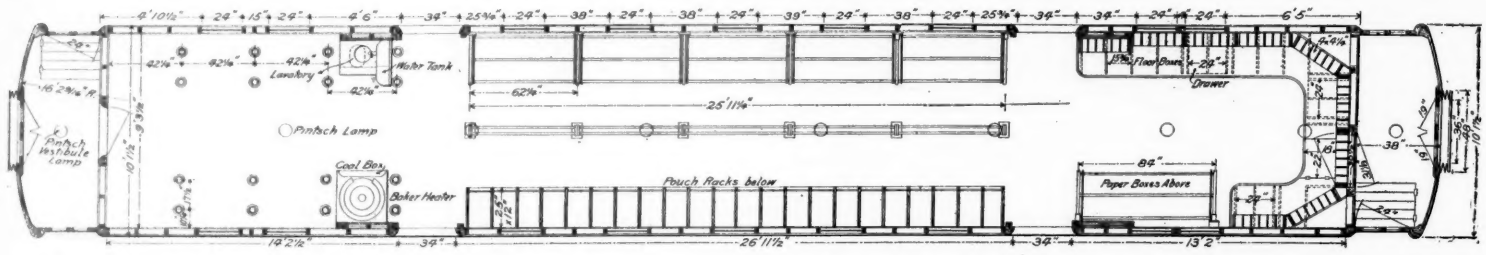


Fig. 2.—Plan of Postal Car—St. Louis, Iron Mountain & Southern Railway.

heating, in connection with the Baker heater, and are lighted with Pintsch gas, each having nine lamps. Besides the Harrison system of improved pouch racks, each car contains 540 reversible letter pigeon holes, 100 available paper boxes and a storage-room in the end 9 ft. 2 in. × 14 ft., divided into eight pockets, also, the latest improved tables, paper boxes and other fittings necessary for the distribution of mail. The interior is finished in walnut.

Figs. 3 and 4 show the standard six-wheel truck used under these cars. The center plate is carried by a 9-in. × 12-in. × 2 ft. 11-in. timber, which is connected by 4 × 1¼-in. × 3-in. iron straps to timber swing logs or bolsters, 8 in. × 12 in. × 5 ft. 8 in. long, one on either side of the center wheel. Triple elliptic springs, with a capacity of 17,000 lbs., are interposed between the bolster and the 3-in. timber spring plank, the whole being swung from the truck frame. Coil springs transmit the weight of the car and truck to equalizers, which in turn rest on the journal boxes. The frame proper is made of heavy timbers and covered with iron plates wherever exposed to special wear. The wheels are of cast iron, 33 in. in diameter, the axle journals being 4½ in. × 8 in.

These cars are equipped with the Westinghouse automatic quick-action air-brake and signal apparatus and the National Hollow brake beam.

Experts who have examined these cars say they are the most complete of any so far built. We are indebted to Mr. Frank Rearden, Superintendent of the Locomotive and Car Departments of the Missouri Pacific, for drawings and information regarding these cars.

The New Battleships.*

This paper consists of a brief description of the special features of the Alabama class, the most recently designed battleships of the United States Navy, with a tabular statement of the general particulars of the designs.

One of the principal difficulties in the designs of our war vessels is that due to the shallowness of our harbors. The absolute limitation in draught imposed by this condition greatly complicates the design when so many other elements have to be taken into consideration; but the success attained in this direction is believed to be quite satisfactory, since the draught of the new battleships is only 23 ft. 6 in. at their normal displacement, with all outfit, and two-thirds supply of stores, ammunition, etc., on board and 800 tons of coal in the bunkers.

Experience with battle-ships recently commissioned for active service has shown that there are decided advantages to be obtained from increased freeboard forward; this not only contributes to the sea-going qualities of the vessel, but adds greatly to the comfort and habitability of the ship. It also places the forward turret guns higher above the water line, and thus insures their being worked in almost any sort of weather.

In all recent designs of battleships for the United States Navy, a moderate speed only has been attempted, as it has generally been held in this country that the high speeds aimed at by some foreign navies were not desirable in battleships when obtained by sacrificing other and more essential qualities.

The framing of these new battleships is slightly different from that hitherto in vogue in vessels of this class. The main frames are continuous from the keel to the armor shelf, and again from the armor shelf to the upper deck. The longitudinals are continuous, their lower edges being scored over the main frame angles, and the lower angles of longitudinals being worked intercostally. The upper angles of longitudinals are, however, continuous, while the reverse bars are worked intercostally.

Docking keels are provided, the extremities of these keels terminating at the athwartship planes passing through centers of 13-in. turrets, the bottom surface of the docking keels and the middle line heel of the ship being in the same horizontal plane. The bilge keels do not project beyond the turn of bilge amidships, but are narrowed down to nothing as they approach the midship section of the vessel, thus forming no obstruction in passing through the gateway of dry-docks.

The hull is protected against injury at the water-line region by heavy tapered armor of a maximum thickness of 16½ in. and extending from 3 ft. 6 in. above to 4 ft. below the normal load water-line. The maximum thickness is maintained for the entire length of the engine and boiler spaces. From the forward athwartship coal-bunker bulkhead the thickness is gradually reduced until it reaches 4 in., which thickness is maintained to the bow. At the top of the belt, for the length of the engine and boiler spaces, a flat protective deck 2¾ in. thick, worked in three layers, extends from side to side of the vessel, being tap-riveted to the upper edge of the side armor. Forward of the machinery space, however, the protective deck is turned down or inclined to the armor shelf level. Thus, any projectile passing through the vertical armor would, even if it were not broken up or deflected in its passage, have to encounter a sloping deck 3 in. thick. Abaft the heavy armor belt, the protective deck is worked in a similar manner to that described for the forward end of the ship, except that the slope plating is increased to 4 in. in thickness in order to give greater protection to the steering gear. Where the protective deck is inclined at the sides, as above described, coffer-dams 3 ft. in width and extending to the top of the armor belt are provided, and are to be packed with corn-pith cellulose, compressed to a density of 6 lbs. per cubic foot.

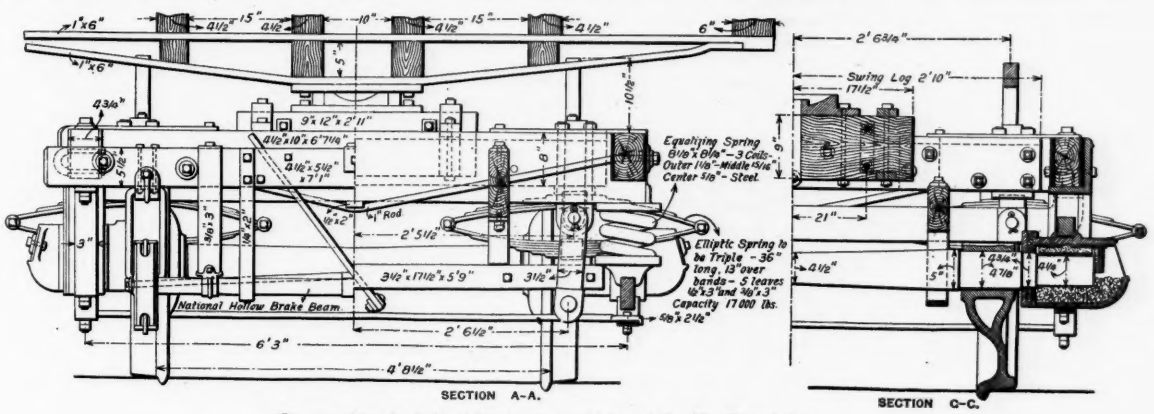

SECTION A-A.
SECTION C-C.
National Hollow Brake Beam
Equalizing Spring
Elliptic Spring to be Triple - 36" long, 13" over bands - 5 leaves
Capacity 17 000 lbs.
Swing Log 2'10"

Fig. 3.—Standard Six-Wheel Truck—Missouri Pacific Postal Car.

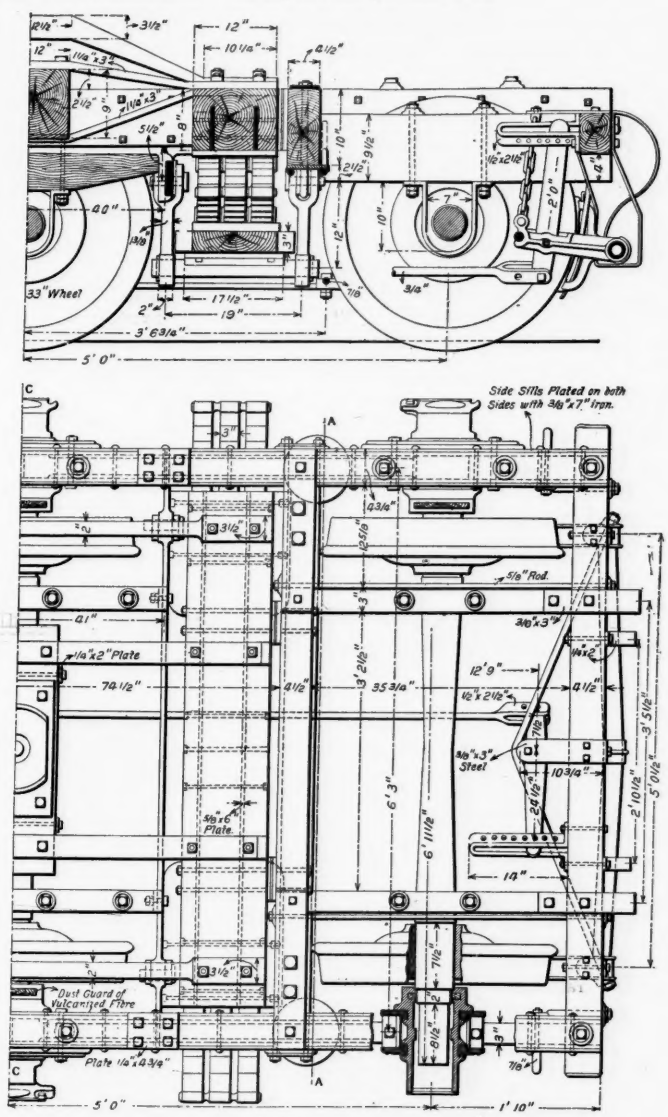

33" Wheel
Side Sills Plated on both Sides with 3/8" x 7" iron.
5/8" Rod.
1/4" x 2" Plate
Dust Guard of Vulcanized Fibre
Plate 1/4" x 43/4"
5' 0"
1' 10"

Fig. 4.—Standard Six-Wheel Truck—Missouri Pacific Postal Car.

To provide as far as possible against the serious damage to boilers and engines, due to a raking fire from forward or aft, the opening between the flat deck and the sloping sides is, at each end of the machinery space, closed by diagonal armor bulkheads 12 in. thick. From the top of the thick belt, extending to the main deck, the hull is further protected by a belt of light armor 5½ in. thick; this armor extends from barbette to barbette, ending in diagonal bulkheads in line with the 12-in. bulkheads below. Within the limits of this belt the broadside torpedo tubes are placed. Inboard of this 5½ in. armor, and extending well forward and aft, as shown on plans, are worked coffer-dams three ft. wide and three ft. high, the top of the coffer dams being 6½ ft. above the load water-line. These coffer-dams are also filled with corn-pith cellulose packed to the same density as those on the protective deck.

The side of the ship between main and upper decks, and from forward barbette to a point just forward of the after turret, is protected by 5½-in. armor, with diagonal armor terminations, the forward one being worked immediately over the diagonal bulkhead of the deck beneath. Within this light redoubt are placed eight of the 6-in. rapid-fire guns. Thus, the central portion of the vessel is completely enclosed by a continuous wall of armor extending from 4 ft. below the load water-line to the level of the upper deck a distance of about 23 ft., and the walls of this redoubt are in no place less than 5½ in. thick.

In addition to this very complete protection of the greater part of the 6-in. R. F. G. battery against the entry of smaller projectiles, the gun's crews are still further protected by 1½-in. splinter bulkheads worked between each pair of 6-in. guns. The other 6-in. gun positions, on the gun deck forward and on the upper deck amidships, are protected by armor 6 in. thick, that on the upper deck being turned in at the ends so as to afford protection against raking fire. The conning tower is protected by armor 10 in. thick, being connected with a central station below the protective deck by a tube, the walls of which are 7 in. thick.

In addition to the conning tower forward these vessels are provided with an armored signal tower at the after end of the superstructure deck, the walls of this tower being 6 in. thick.

In the character and arrangement of the battery of the Alabama class decided changes have been made from the designs of former ships of this type in our service. In the first place, the 8-in. battery has been entirely abandoned, and the calibers of the heavier guns reduced to two, viz.: 13-in. and 6-in guns.

The main battery will consist of four 13-in. guns, mounted in pairs in turrets forward and aft on the midship line, and protected by armor 15 in. thick, with port plates 17 in. thick. The ammunition hoists and revolving gear of turrets are protected by barbettes 15 in. thick, except over the arc within the diagonal armor, where the barbette is reduced to a thickness of 10 in. to save weight.

The turrets are oval in shape, with the front plates slightly inclined and the rear plates vertical, in order to give ample room for handling the guns and their loading appliances. The forward turret is at the level of the forecastle deck, the axis of the guns being 26 ft. 6 in. above the normal load water line; the after turret is on the main deck the axis of the guns being 19 ft. above the normal load water line. Each pair of guns sweeps an arc of 135 deg. from the midship line.

Between the 13-in. gun emplacements and within the armored casemate previously described are eight 6-in. R. F. guns in broadside. These guns are capable of a total arc of train of 90 deg. and are protected by 3-in. shields supported on the carriage and the 5½ in. armor of the casemate. Each gun is separated from its neighbor by 1½-in. steel splinter bulkheads. Four more 6-in. R. F. guns, two on each side, are mounted on the upper deck above this casemate; they are protected by 6 in. of armor and are capable of firing fore and aft. On the gun deck forward is another pair of 6-in. guns, protected by an armor plate 6 in. thick.

The auxiliary battery consists of 17 6-pounders and six one-pounder guns, mounted where practicable to obtain good command and yet be clear of the blast from, and interference with, the rest of the battery. Four broadside torpedo tubes, protected by 5½ in. of armor, complete the armament of these vessels.

The main propelling engines will be of the vertical, inverted cylinder, direct-acting, triple-expansion type and will be placed in two water-tight compartments separated by a middle line bulkhead. There will be eight single-ended steel boilers of the horizontal-return fire-tube type, placed in four water-tight compartments.

Dimensions and Particulars.—Hull.

Length over all	373 ft. 9 in.
Breadth extreme	72 ft. 2½ in.
Freeboard forward	20 ft.
Freeboard aft	13 ft. 3 in.
Mean draught (with 800 tons coal and ⅔ stores and ⅔ ammunition)	23 ft. 6 in.
Corresponding displacement	11,520 tons
Speed per hour, in knots	16
I. H. P.	10,000
Area of midship section	1,613 sq. ft.
Area of load water plane	19,900 sq. ft.
Tons per inch of immersion	47.38
Moment to alter trim 1 in.	923.65
Wetted surface	35,300 sq. ft.
Rudder area	225 sq. ft.
Maximum helm angle { Starboard	35 deg.
Maximum helm angle { Port	35 deg.
Mean draught (with all stores, provisions and ammunition and 1,200 tons of coal on board)	24 ft. 7 in.
Corresponding displacement	12,140 tons
Metacentric height (at 24 ft. 7 in. draught)	4 ft. 6 in.
Range of stability at same	65 deg.
Maximum righting arm	2 ft. 6 in.

*Abstract of a paper read by Chief Constructor Philip Hichborn, U. S. N., before the Society of Naval Architects and Marine Engineers, New York, Nov. 13, 1896.

Maximum righting moment	30,350 ft. tons
Angle of maximum righting arm	35 deg.

Armament.

Main battery	4-13 in. B. L. R. 14 6 in. R. F. G.
Secondary battery	17-6 pdr. R. F. 6-1 " " " 4 Gatling. 1 field gun.
Height of axis of forward 13-in. guns above normal L. W. L.	26 ft. 6 in.
Height of axis of after 13-in. guns above normal L. W. L.	19 ft.
Mean height of axis of 6-in. guns on main deck	15 ft. 4½ in.
Mean height of axis of 6-in. guns on upper deck	22 ft. 9 in

Armor.

Material; Harveyed nickel-steel.

Water-line belt, thickness amidships	Top ..... 16½ in. Bottom ..... 9½ in.
Height of upper edge above normal load line	3 f. 6 in.
Total depth of belt	7 ft. 6 in.
Side armor above main belt, thickness	5½ in.
Superstructure armor, thickness	5½ in.
Turret armor (13-in. guns), thickness	17 and 15 in.
Barbette armor, thickness	15 and 10 in.
Protective deck armor, thickness	2¾ to 4 in.
Conning tower armor, thickne s	10 in.

General Schedule of Weights.

	Tons.
Hull and fittings, including wood-backing and miscellaneous items	4,918
Armor and bolts	2,7 9
Protective deck armor	593
Armament and ⅔ ammunition	864
Equipment and ⅔ stores, fresh water and provisions	498
Machinery, propelling, with water	1,128
Normal coal	800
Total	11,520

Machinery.

Collective I. H. P. of propelling, air pump, and circulating-pump engines	10,000
Number of revolutions for above I. H. P	120
Diameter high-pressure cylinder	33½ in.
Diame er intermediate cylinder	51 in.
Diameter low-pressure cylinder	78 in.
Length of stroke	48 in.
Cooling surface of main condensers	7,000 sq. ft.
Cooling surface auxiliary condenser	800 sq. ft.
Dimensions of boilers: Length	9 ft. 11¾ in.
Dimensions of boilers: Diameter	15 ft. 6½ in.
Working pressure (pounds per square inch)	180
Total heating surface of all boilers	21,200 sq. ft.
Total grate surface	685 sq. ft.
Number of furnace flues	4
Diameter of flues	39 in.

The Tennessee Centennial Exposition.

On June 1, 1896, the state of Tennessee celebrated its centennial anniversary at Nashville by ceremonies appropriate to the occasion On that day, in conjunction with the ceremonies, an exposition was formally inaugurated and will be open to the public May 1 1897, and continue for six months. The management promises to have the buildings ready before March 1, 1897, and exhibitors must forfeit a deposit if exhibits are not ready for inspection on April 30. No charge will be made for a reasonable amount of space in any of the buildings, communications concerning which should be addressed to the Director General of the Tennessee Centennial Exposition, Nashville, Tenn.

Besides the 12 main exhibit balls there will be an auditorium of unique design. All the buildings are at present under construction and some are nearing completion. The Machinery Building, designed by Messrs. Gi:bel & Gaebler, is 326 ft. long by 124 ft. wide, with a boiler-room 162 ft. × 72 ft. Special arrangements have been made so as to enable pump makers and others who deal in hydraulic machinery to test them in the building and to show them in operation. A communication from Professor Magruder in regard to the use of compressed air at the Exposition will be found in the *Railroad Gazette* of Sept. 11, last.

Among the officers are the following: President, John W. Thomas; Secretary, Charles E. Curry; Director-General, E. C. Lewis; Department of Transportation, J. W. Thomas, Jr.; Department of Machinery, W. T. Magruder; Department of Electricity, J. W. Braid; Department of Geology, Minerals and Mining, J. M. Stafford; Department of Forestry, A. E. Baird.

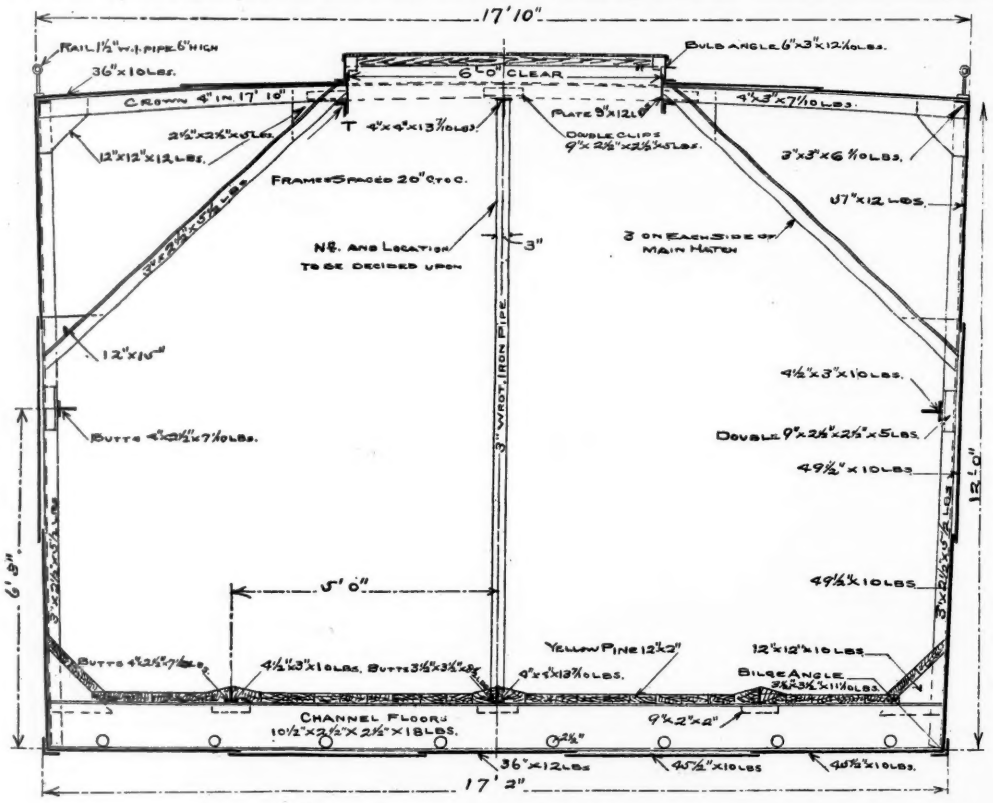
Steel Canal Boats.

In a paper before the Society of Naval Architects and Marine Engineers, held in New York Nov. 12 and 13, Mr. Lewis Nixon described the steel canal boats built last year to run between Cleveland and New York City through Lake Erie, the Erie Canal and the Hudson River. The paper is accompanied by midship cross-section drawings showing the construction of the vessels and one of these drawings, that of the consorts, or boats without self-propelling power, is reproduced herewith. A steamer and five consorts were built i 1895, and this year three steamers and ten censorts have been ordered, these to be 2 ft. deeper than the others, with a view to utilizing the increased depth of water in the canal, which is expected to be available next year. The first six boats were 98 ft. long, 17 ft. 10 in. wide and 10 in. deep. The steamer, with its 120 H. P. compound engine, carries 125 tons of freight, while the consorts carry 230 tons each. The boats have encountered rocks in the Erie Canal but without suffering harm, and one fleet wer thered a very severe storm on Lake Erie but came out without damage.

The boats in the last order are made of open-hearth steel, with a tensile strength of 60,000 lbs. and an elongation in 8 in. of 20 per cent. The engines developed 275 H. P., the cylinders being 12 and 24 × 16 in.

The consorts have frames 3 in × 2½ in. of 5½ lbs. per foot, spaced 20 in. apart. Forward, the frames, floors and beams are canted, and alternate frames for 18 ft. on each side of the stern are built as web frames. A heavy breast hook is worked across the stem. The floors are made of channels 10½ in. deep, weighing 18 lbs. per foot. Keelsons and longitudinals are formed by heavy T bars. The main hatch is 30 ft. long. The hatch is framed with a 6-in bulb angle, forming a girder in connection with a 9-in. plate, and this girder is braced to the frames by 3½ in. × 2½ in. 5½ lb. angle struts. Wooden hatch covers are fitted and a tarpaulin cover is secured over this by means of iron clamps, wedges and battens worked on the coaming. The steamers are built with rounded bilges, but with about the same general construction as the barges.

Mr. Nixon's paper is devoted largely to an argument on the economy of running boats through from lake ports to New York without transfer of freight. Much of his argument is based on advantages which are equally available for ordinary canal boats. He lays stress on the high cost of lighterage in New York Harbor, which increases the cost of grain seat by rail, and the transfer charges at Buffalo are also declared to be excessive, although no figures are given. Aside from the saving in cost of transferring grain, the author's strongest argument in favor of the steel boats is one which is, in a sense, distinct from the peculiar merits of the boats themselves, being the advantage of a strong company, doing a large business. The company running these boats hopes to establish storage houses in New York, so that freight can be sent at any time and in any quantity. Lack of terminal facilities and the divided ownership of the ordinary canal boats are the greatest existing obstacles to the success of freight traffic over the Erie Canal.



Midship Section of 100-ft. Steel Canal Boat.

Transmission of Electric Power from Niagara Falls to Buffalo.

On Monday morning of this week, the long-talked of transmissions of electric energy from Niagara Falls to Buffalo became an accomplished fact. The overhead lines of the Buffalo City Railway Co. were filled with the "fluid" that was generated 22 miles away. As far as we have learned, there was no trouble whatever with the new transformers and other apparatus, and the transmission may be looked upon as something more than an experiment.

In 1877 the late Sir William Siemens, in his presidential address before the Iron and Steel Institute of Great Britain, spoke of utilizing the power wasted in the Falls of Niagara, and said: "Time will probably reveal to us the effectual means of carrying power great distances. A copper rod, 3 in. in diameter, will be able to transmit 1,000 H. P. to a distance, say, of 30 miles." In 1882 M. Depretz tried in vain three times to transmit power economically from Weissbach to Munich, a distance of over 35 miles, by means of an iron telegraph wire 0.18 in. in diameter. Although his attempt did not accomplish immediate results, his experiments indicated what was necessary in order to succeed. The *increase of pressure* seemed to be the key to the entire situation, and it has been shown since by experimental proof that he was working in the right direction. Based upon the foundation laid by M. Depretz, experiments have been in progress ever since. The name of Nikola Tesla is among those who have made it possible to transmit Niagara's power to Buffalo.

The three-phase system, as developed by the General Elecctric Co., is employed at Niagara, and the cables which carry the current have a capacity of 1,000,000 circular mills. There are two 1,250 H. P. transformers at the Niagara Falls end of the line and three 350 H. P. transformers at the Buffalo end. The current is carried over the main portion of the line at 11,000 volts by a three-phase current and is changed into a direct current by means of a rotary transformer before it is used in Buffalo. The efficiency of the turbine which is connected with the generator is about 83 per cent., but we have not yet received such figures as will enable us to tell what percentage of energy generated at the Falls is available at Buffalo.

For further information, the reader is referred to the *Railroad Gazette* of Aug. 7 of the current year.

The Western Freight Association Agreement.

At a meeting of the Executive Board of the new Western Freight Association last week, Mr. Marvin Hughitt, President of the Chicago & North Western, was elected Chairman of the Board. We understand that the two members of the Board of Administration last elected, have accepted, which makes the complete Board as follows: J. W. Midgley, C. L. Wellington, C. A. Parker, H. H. Courtright and H. L. Shute.

The good effects of the new agreement are already apparent, a Kansas City paper stating that the grain dealers of Kansas City are now grumbling because th re-consignment of grain at that city has been abolished. Heretofore, grain from Kansas and Nebraska points has been shipped to Kansas City, stored in elevators and sent on eastward at the balance of the through rate at any time within six months. Under a ruling of Chairman Midgley, just issued, grain destined for other markets can not be thus stopped. Shipments must go through without delay if the through rate is to be taken advantage of. As rates now are, stopping off will cost on the average 4 cents per 100 lbs.

The articles of agreement of the new association, dated Oct. 22, are as follows:

Preamble.—To aid in fulfilling the purposes of the Interstate Commerce Act and all other statutes relating to or affecting the traffic hereinafter described, to cooperate with each other and adjacent transportation associations, to establish and maintain reasonable and just rates, rules and regulations on state and interstate traffic, to prevent unjust discrimination, and to secure the introduction of economies in the conduct of the freight service—

The Atchison, Topeka & Santa Fe; Burlington, Cedar Rapids & Northern; Chicago & Alton; Chicago & Northwestern, Chicago, Burlington & Northern; Chicago, Burlington & Kansas City; Chicago, Burlington & Quincy; Chicago Great Western; Chicago, Milwaukee & St. Paul; Chicago, Rock Island & Pacific; Chicago, St. Paul, Minneapolis & Omaha; Hannibal & St. Joseph; Illinois Central: Kansas City, Fort Scott & Memphis; Kansas City, St. Joseph & Council Bluffs; Minneapolis & St. Louis. Missouri, Kansas & Texas; Missouri Pacific; Rock Island & Peoria: Sioux City & Pacific; St. Louis & San Francisco; St. Louis, Keokuk & North Western, and the Wabash (Railroad and Railway) Companies, and such other lines as may become parties hereto, hereby agree to form an Association to be called the Western Freight Association.

Article 1.—The Association shall have control of all freight traffic now subject to the Western Freight Association; also such other territory as may be hereafter agreed upon.

Art. 2.—The Association shall be governed by an Executive Board and a Board of Administration.

Art. 3. *Sec.* 1.—The Presidents of the Companies members of the Association shall constitute the Executive Board, but may designate another officer, fully empowered, to represent them thereon. *Sec.* 2. The Executive Board shall meet upon the written request of three or more members thereof, or upon call of the Chairman. *Sec.* 3. Two-thirds of the members of the Executive Board shall constitute a quorum. *Sec.* 4. It shall require the unanimous action of those present to adopt any proposition coming before the Executive Board. *Sec.* 5. The Executive Board shall elect the Chairman and the members of the Board of Administration (and

fix their salaries), and the salaries of other officers and employees of the Association shall be subject to its review and approval. *Sec.* 6. The Executive Board shall prescribe the rules for the admission of new members.

Art. 4.—The Board of Administration shall consist of five members, of whom the Chairman of the Association shall be one. They shall be elected by unanimous vote.

Art. 5.—The headquarters of the Association shall be at Chicago, Ill., and the members of the Board of Administration shall reside there. They shall devote their entire time to the Association, and shall meet daily, Sundays and holidays excepted. The Chairman of the Association shall be Chairman of the Board, but a Vice-Chairman shall be elected annually by the Board from its own body, who shall preside in the absence of the Chairman.

Art. 6, *Sec.* 1.—Except as hereinafter provided, the Board of Aministration shall control the rates, rules and regulations governing the traffic subject to this Agreement.

Sec. 2. It is charged with the duty of securing to each party a fair share of the competitive traffic, so far as can be legally done.

Sec. 3. It may determine the divisions of rates between parties hereto, and between them and their connections, keeping in view uniformity and the equities involved; provided, that this shall not authorize changes in divisions between proprietary lines or lines owned or controlled by the same interests; provided, further, that as regards traffic contracts at this date actually existing between lines not having common proprietary interests, the same shall be reported, so far as the divisions are concerned, to the Board of Administration, to the end that divisions with competing lines may, if thought advisable by them, be made on equally favorable terms; it being understood that the control hereby given over divisions between parties hereto and connections not parties to this Agreement, shall not be so exercised as to require the withdrawal or modification of authorized or agreed divisions with such connections, except in cases wherein the latter persist in manipulating or using the same to cut the established rates or disturb the general rate situation, which it is the purpose of this Agreement to protect.

Sec. 4. It shall decide the course which shall be pursued with Companies not parties to this Agreement, that decline to observe its rates and rules. The interests of the parties hereto injuriously affected by such action, shall be accorded reasonable protection in so far as the said Board can legally do so.

Sec. 5. It shall, so far as practicable, work in harmony with and secure the co-operation of Freight Associations in adjacent territory, and where lines members of this Association are also members of other Associations, such lines shall be given fair and equitable protection against any manipulation of rates between members of this Association and lines not members of this or adjacent Associations, in so far as can legally be done.

Art. 7.—To enable the Board of Administration to act intelligently upon changes proposed in rates, rules and regulations which shall govern the transportation of freight included in this Association, a *Rate Committee* shall be constituted (to consist of a duly accredited traffic officer from the assenting railroad companies), their recommendations and action not to be made effective until the same shall have been approved by the Board of Administration; the Chairman to name the date when such arrangements shall take effect. The said committee shall meet monthly, or oftener, as may be necessary. [Pending the appointment of a committee as above those now performing corresponding duties in Western Freight territory shall be continued.]

Art. 8.—A four-fifths vote of the Board of Administration shall be necessary to the adoption of any proposition.

Art. 9.—Reasonable notice shall be given by the Board of Administration to all members of the Association of subjects coming before it for consideration, and any member shall be afforded an opportunity, under the rules of said Board, to present its views before final action.

Art. 10.—The first order of business before the Board of Administration shall be the hearing of complaints of departure from authorized rates or regulations. Complaints may be made by telegraph or otherwise, and investigations shall be immediate and thorough. The Board, through the Chairman, may order complainants or respondents to appear at once before the Board.

Art. 11.—The Board of Administation may proceed, of its own motion, to correct violations of rules or rates, and in any matter having for its object to reform and better the rate conditions and advance the interests of the members of the Association.

Art. 12.—Sec. 1. Obedience to the orders of the Board of Administration first, and appeal or protest (if any) afterward, shall be the invariable rule. Sec. 2. The action of the Board of Administration shall be subject to appeal to the Executive Board. Sec. 3. Any party appealing shall notify the Chairman of its desire so to do, and such appeal shall be docketed for consideration at the next meeting of the Executive Board; provided that, in case the appellant desires immediate consideration, the Chairman shall request a special meeting of the said Board as provided in Article 3 hereof.

Art. 13.—No Company shall deviate from or change the rates, divisions, rules or regulations fixed by the Association, except by resolution of its Board of Directors, which shall not be effective until six days after its adoption. A copy of the resolution authorizing changes, shall be immediately forwarded to the Board of Administration, which shall, upon its receipt, act promptly for the protection of all interests; provided the Board of Administration shall be notified of the intention of any member to apply to their (its) Board of Directors for permission to make changes in rates, divisions, rules or regulations.

Art. 14.—Sec. 1. The Board of Administration shall promptly investigate complaints of rate-cutting, manipulation or violations of Agreement of any kind. In pursuance thereof, it may require the affidavit or sworn statement of any traffic or other officer or agent of either one or more parties hereto, on any point or question deemed pertinent to the complaint. Sec. 2. If such affidavit or sworn statement be not furnished by the officer or agent of the line complained of within twenty days after called for, the guilt of such line shall be considered as admitted by it Sec 3. For any action by any party hereto, which the Board of Administration shall decide to be in violation of this Agreement, the offending party shall forfeit a sum to be fixed by the Board of Administration, which sum shall not be less than the gross earnings on the traffic involved would be, if extended at the standard rates, nor more than $2,500 for each offense. The forfeiture shall apply to the expenses of the Association, but the offender shall not benefit by such application.

Art. 15.—Sec. 1. The Association expenses shall be apportioned fairly between the lines by the Board of Administration. Sec. 2. A working fund of $15,000 shall be kept on deposit with the Chairman, to be assessed in accordance with the apportionment made by the Board of Administration. The expenses of the Association shall be paid therefrom, and drafts of the Chairman shall be paid monthly to keep amount intact. Sec. 3. The balance of said deposits, remaining at the expiration of this Agreement, shall be divided between the Companies then parties thereto, in the ratio in which they have contributed.

Art. 16.—Any party retiring from this Agreement before the completion of the time herein fixed, except by unanimous consent, shall forfeit its interest in any Association funds; but, if any Company fails to observe and be governed by this Agreement—which fact shall be determined by the Board of Administration—and fails to pay its forfeitures within 15 days after the decision of said Board, then any other Company may withdraw from this Agreement on giving 30 days' written notice to said Board, and such Company so withdrawing shall be entitled to its interest in any Association funds.

Art. 17.—The powers and duties of the Chairman shall be as follows: He shall preside at all meetings, keep the records of the Association, promulgate all changes in rates, divisions, rules or regulations, and fix the date when the same shall be made effective—when not otherwise provided—and he or his representatives shall be given access to all records of the parties hereto, that pertain to the traffic subject to this Agreement.

Art. 18.—Ten days in advance of a meeting of the Executive Board, the Chairman shall furnish the members a list of subjects for consideration. Subjects not listed may be considered, but affirmative action thereon will not be effective until approved by absentees; provided that failure to respond on the part of any member within 15 days of the date of the Chairman's notice shall be considered an affirmative vote.

Art 19.—Authority conferred upon either of the Boards hereby created shall be so construed and exercised as not to permit a violation of the Interstate Commerce Act, the laws of any State, or other laws applicable to, or the provisions of the charters of, any of the parties hereto, and the Board shall co-operate with the Federal and State railroad commissions to secure stability and uniformity in rates and rules.

Art. 20.—The rates, rules and regulations of the present Western Freight Association shall remain in force until changed, as provided herein.

Art. 21.—No change shall be made in these Articles of Agreement except by consent of each member of the Executive Board.

Art. 22.—This Agreement shall become effective Nov. 2, 1896, and continue in force until Dec. 31, 1898, and thereafter, until 90 days after written notice of intention to withdraw therefrom shall have been given by one or more companies to the Association, through the Chairman; provided that such notice shall not be given before Dec. 31, 1898.

The Board of Administration has organized by the election of C. A. Parker, Vice-Chairman, and R. F. Wilson, Secretary. The Rate Committee, provided for by Article 7, is constituted as follows: W. B. Biddle, F. T. M., A. T. & S. F.; T. H. Simmons, G. F. A., B. C. R. & N.; F. A. Wann, G. F. A., C. & A.; H. R. McCullough, G. T. M., C. & N. W.; Thos. Miller, G. F. A., C. B. & Q.; W. J. C. Kenyon, G. F. A., C. B. & N.; D. O. Ives, G. F. A., H. & St. J.; J. H. Hiland, G. F. A., C. M. & St. P.; J. M. Johnson, F. T. M., C. R. I. & P.; J. T. Clark, G. T. M., C. St. P. M. & O.; W. E. Keepers, G. F. A., Ill. Central; W. M. Hopkins, G. F. A., M. & St. L.; R. Stockhouse, G. F. A., R. I. & P.; Geo. W. Cale, F. T. M., St. L. & S. F.; P. C. Stohr, G. F. A., C. G. W. Representatives from the K. C. F. S. & M., Mo. Pac., S. C. & P. and Wabash have not yet been appointed by the executive officers. This committee will elect a chairman from its number. Rules to govern the committee will be announced hereafter.

Electric Traction Under Steam Railroad Conditions.*

OPENING REMARKS BY DR. CHAS E. EMERY.

In the light of recent achievements, it can be assumed at the outset that electric traction under steam railroad conditions is feasible. The only question is whether it will pay. In suburban traffic a certain flexibilty is necessary by which large crowds may be taken when desired; and if the comfort of the transit can be so increased as to make frequent trips desirable to travelers, the business will be built up and the heavy expenditures necessary to change to electricity be compensated for in this way, even on the present steam operated roads for considerable distances from large business centers. It does not seem probable, however, under present conditions, that any probable increase of travel will warrant the enormous outlay necessary to secure electric traction throughout the whole length of our trunk railroads.

The greatest practical efficiency of an electric system of the kind proposed between the engines at the central station and the rails would probably be 60 per cent. This, on account of a second transmission to sub-stations and the necessity of using rheostatic regulation to some extent, would probably be reduced to 50 per cent., so that twice as many horse-power would need to be generated at the central station as at the track with the present steam locomotives.

Each horse-power in the central station will be developed for 2 lbs. of cheap coal or 4 lbs. per net horse-power delivered, whereas the steam passenger locomotive will, on the average, require 6 lbs., based on net tractive force and allowing for the various wastes. The saving in coal due to electric passenger traction will, therefore, be one-third. Coal is procured cheaply by the railroads, but probably an inferior quality costing 50 cents per ton, or say 25 per cent. less than that used on locomotives, could be employed in the electric stations, so that for trains of like weight the saving in cost of coal for passenger service would be $\frac{3}{4} \times \frac{2}{3} = \frac{1}{2}$. For freight engines we calculate the saving in cost for fuel will be about 55 per cent., and for switching engines about 66⅔ per cent. On railroads running through the coal regions the total cost of coal is about 9 per cent. of the total operating expenses. A saving of one-half in the cost of coal then corresponds to a saving of 5 per cent. of operating expense.

It is believed that for general railroad work, independent electric locomotives will be required, and that these will necessarily be as heavy as present steam locomotives, on which basis the only saving in weight will be that of the tender, which we have assumed as 10 per cent. of the total weight of the train for passenger engines, 3.3 per cent. for freight engines, and 5 per cent. for switching engines. The total load to be hauled will therefore be decreased by these several percentages, and the cost of coal reduced thereby to 45 per cent. of that required by the present locomotives for passenger trains; 43½ per cent. for freight trains, and 32 per cent. for switching trains. Applying these percentages for the relative amounts of coal used for these different purposes on a prominent railroad, the average saving in fuel becomes 58.9 per cent. or 5.89 per cent. of operating expenses. The cost of water is taken at ⅝ of 1 per cent. on the same basis which increases the saving to 6.56 per cent.

It cannot be far in error to assume that the question of repairs will be about balanced, independent of central station apparatus otherwise provided for.

It has been claimed that labor will be saved because the second man on an electric locomotive is required simply to provide for sickness or accident of the driver and can well be the baggage man of a passenger train or the conductor of a freight train. Something of this kind may be worked out on an unimportant country road, but it would be impracticable on a large business scale.

It is also claimed that there will be a saving in the weight and cost of electric locomotives, particularly when applied under a car, but this system is of limited application. Heavy locomotives on trunk lines must have the same weight for electric as for steam traction, independent of the tender, as explained hereafter. Large savings in repairs to tracks and bridges are also claimed on account of the smoothness with which electric locomotives having no reciprocating parts would operate. The same weights must be run over the same rails at the same speed, and at least a great part of the wear and tear would be due to inequalities of the track surface which would influence both systems alike. The present locomotives are so designed that, while the wheel loads on the drivers are heavy, the masses which strike blows are comparatively light; that is, they have simple wheels and axles, spring-connected to the frames. this is a very difficult thing to accomplish with an electric locomotive without using exactly the same construction. On a comparatively smooth track, remarkable steadiness of movement may be obtained, if the armatures of the motors are secured to the axles of the driving wheel and the fields supported concentric therewith, but such an arrangement is entirely unfitted for a railroad track in average condition. Springs only relieve the frame. Each pair of wheels and attached motor acts as an enormous trip-hammer on the rails and roadbed the moment the former gets at least out of alignment, by defect in original construction, by settling after rains or from other causes. A connection to driving axles through gearing reduces the blows very materially, but introduces at high speed another difficulty. The vertical movements of the main axle would necessarily cause a change in the angular velocity of the armature during the time of such movement, which, for jars occurring in the fraction of a second, would bring a heavy strain on the gearing and vary the speed of the armature momentarily. The variations in current due to such variation may also give a longitudinal pulsation to the train. The matter is not helped at all by mounting the motors on hollow axles concentric with the driving axles so that the motors may be spring-supported from the axles, for in such a case the connection of the motor to the axles must be through links the equivalent of a universal joint, which produce variations in velocity, when the axles are out of center with the armature, similar to those where gearing is employed. In fact, these very devices are used to obtain variation in angular velocity in many machines. Either gearing or universal joints would have back lash when current was shut off.

It will be necessary to mount electric motors for fast locomotives away from the centers of the axles and connect through side rods, as in the present locomotives. The only other method would be to use chains, which are mechanically impracticable. There is another important reason for this. In order to obtain speed the motors must be wound for it so that the counter electro-motive force will be produced by velocity rather than the number of turns, and, in starting, the motors are necessarily connected in series so as to reduce the starting current. For motors adapted to very high speeds, it will be necessary to put pairs in series even to surmount heavy grades, to act as pushers in case of accident, or in removing snow, etc. The counter-electro-motive force is therefore divided between several motors, but not necessarily in equal degree. If, with motors connected to separate axles, one for any reason slips its wheels, it will monopolize the larger portion of the electro-motive force and cut down the current on all the motors in series so that full power cannot be obtained. Working the motors in parallel with an enormous rheostat would be wasteful and, in some cases, impracticable. It is, therefore, important for two reasons to connect driving wheels operated by separate motors by means of side rods.

(*Continued on page* 810.)

*A topical discussion at the 109th meeting of the American Institute of Electrical Engineers.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The breakage of the red glass of a signal lamp at Boston recently, as described in our accident record to-day, caused the derailment of a passenger train, and but for the derailer might have caused a crossing collision. This is one more argument for the abandonment of white lights for fixed signals. For railroad men who do not see why the great English railroads spent thousands of pounds to change their white signal lights to green, a considerable mass of evidence is slowly accumulating, and it may be that the argument in favor of green will not always be subject to the adverse criticism that the evils to be cured are all in the future. The case reported by us a year ago (page 674) and the Chicago & West Michigan case remain the most prominent accidents from our light system which have resulted in injury to persons, but there are others, some not published, equally significant as warnings. It is to be noted that accidents like this at Boston are not prevented by more surely *locating* the light. For avoiding the danger due to the presence near the railroad of street or dwelling-house lights, we have a pretty good arrangement in the scheme of Mr. Grafton, of the Pennsylvania lines, who always has two lights on a post, even if one of them has to be a dummy. (He has not yet, however, applied this rule to train-order and starting signals.) With two lights always to be seen in the same relation to each other, the chance of error from the cause mentioned is greatly reduced, and in most places, no doubt, practically eliminated. This holds true regardless of their color. We have the same advantage on a four-track road, or in any place where there are two lights side by side, as on a bracket-post. But the loss of a glass, changing the color of a light while neither extinguishing it nor changing its position, is just as dangerous on a bracket-post as anywhere else. The radical remedy remains the same. Green is needed for all-clear, so as to make the lights as well as the other parts of signals comply with the fundamental condition, that any loss or failure of a part shall cause the signal to indicate "stop."

The loss in railroad gross earnings in October was over 2½ million dollars, or 4.33 per cent. on the total earnings of $49,832,000 reported by 132 roads working 95,570 miles of road. This is the third month for which the figures of the *Financial Chronicle* have shown earnings less than in 1895. In September the loss was only $184,000, but in August it was reported as $1,082,000. In July there was an *increase* of over $1,610,000 and the increases in earlier months were even larger, so that, notwithstanding the losses of the last three months, the aggregate earnings for the nine months of 1896 are 13 million dollars larger than those of 1895, amounting to 400½ million dollars. The paralysis which the fear of possible tampering with the financial system of the country brought about in all parts of the country fully accounts for the heavy losses reported. More than two-thirds of the roads, whose earnings the *Chronicle* gives, report decreases and the roads in all sections suffered from the unfortunate conditions of the period, which, everyone is glad to note, seem now to be passing away. The Trunk lines and the lines in the manufacturing states suffered the heaviest losses, as in previous months, and as was natural. All the Trunk lines, except the Grand Trunk, and all the roads except three in the Middle Western group, lost more or less heavily, facts which enable one to appreciate how universal was the restriction in the movement of freight. In the South, as in the West, agricultural products were moving to market, which helped those roads. The earnings of the Southern roads are irregular, but taken together show a loss of $175,000—less than in any other group. The loss in the Southwestern group is not much greater, $245,000, and the returns of the two groups show the effect of a movement of cotton better than that of last year. The statistics of this movement show receipts of 1,424 *million* bales at Southern outports, 250,000 bales more than in 1895. The overland movement was also greater than last year, but the traffic was not as great as in 1894. The Northwestern group has a loss of $678,000, the largest reported. Even with this loss the aggregate reported, $9,390,000, is very nearly up to the totals reported other years previous to 1895. The Northwestern lines have been profiting in other months by a heavy movement in spring wheat, and the falling off in this traffic largely accounts for the small earnings. The improved prices of agricultural products which prevailed during the month induced a heavy traffic in grain throughout the West. Thus, the receipts of corn, wheat, rye, barley and oats at Western markets were over 83¼ *million* bushels in the four weeks, a gain of 16 *million* bushels over 1895, a year when the movement was unusually large. Since Jan. 1 the receipts of corn have been 125 *million* bushels, 50 *million* bushels more than in 1895, and wheat receipts have increased from 122 million bushels to 157 *million*.

Large Freight Cars.

We have laid before our readers a long discussion, by Mr. E. W. Judd, on the best means of correcting the inequalities of our tariffs for carrying freight in large cars, which includes a careful summary of the opinions of a number of experienced men; but it is proper to remind the reader that important elements of the "large-car problem" are omitted, both by Mr. Judd and by those whose views he quotes in support of his own.

The substance of Mr. Judd's argument is that the mechanical problems are easy and will take care of themselves, and that as soon as we recognize the gross inequalities of our present rates for bulky freight, which do not take into account the difference in cubic capacity of different cars, we are on the high road to recovery from the unbusiness-like, not to say disgraceful, state of affairs now existing.

On paper, the operating problem is more difficult to solve than the traffic problem, for the cost of maintaining large cars, which are used only a part of the time, and the *extra* cost of carrying bulky freight in small cars cannot be determined with accuracy. Nevertheless, the actual solution of this may be brought about sooner than that of the traffic problem. Traffic men seem to be able to ignore logic for a life-time, if there is a tangible, immediate profit in so doing, and they succeed wonderfully in getting their presidents to approve such a course, even where it is known that a change, at the expense of temporary loss, would lead to future advantages very much greater. While, therefore, the true method of reforming tariffs may be known, but not for years carried out, the car-builder's and the superintendent's difficulties may be found after a while to have settled themselves.

It is by no means certain, however, that the mechanical officers will be able to apply the remedy the moment they discover it. Experience may, after a time, convince everybody that it is cheaper to carry 10-ton lots of furniture in moderate-size cars of 40 tons capacity than to maintain special furniture cars; but whether the traffic men will not persuade the powers that be to continue the use of furniture cars, to aid them in coddling crotchety shippers, is another question.

As looked at in most of the discussions hitherto had, the first part of the operating problem is, Shall we make large cars for bulky freight when we do not need them for ordinary freight? But what if the master car builders of the country should conclude to make *all* box cars as wide as the bridges and tunnels will permit, and nearly as high? If that should be the outcome, the only remaining mechanical question as regards bulky goods would be as to the *length* of the cars; and we believe that that would be quickly settled in faver of one uniform size. There can be very few kinds of bulky freight, the traffic in which is sufficiently large to warrant, for purposes of economy, the construction of special cars, when the only advantage gained is a saving in the number of wheels. Assuming that cars for second-hand church-organs, S. U., or live ostriches, ought to be 45 ft. long; there would be so few such cars that the expense of getting them to the places where they were wanted would be far greater than the loss from shipping the freight in 34-ft. or 36-ft. cars.

But however rapidly or slowly the master car builders progress toward an agreement on this point, the traffic problem remains the same for all practical purposes, because the rate maker must deal with cars as they are, not with future possibilities; and the condition confronting the traffic manager to-day is how to get along with a few very large cars mixed up with the general supply, which consists of cars of medium and small sizes.

Mr. Judd is undoubtedly right, as far as he goes. Every one admits that cubic capacity is the true basis, or at least an essential element in the true basis, for calculating the charges on freight which is too light to load a car fully to its weight-capacity; and those who propose, in adjusting a rate to cars of different size, to consider only the length of the car, are evidently compromising with what they deem expediency. They think that width and height are factors too small to bother with, or that these dimensions will naturally increase when length increases. It seems hardly worth while to argue much on this point, for if the agitation starts any reform at all, every one must see that it must go farther than this; adjusting rates by length only is but a half-way measure. Unfortunately, the vicious rate-making customs which have been introduced in connection with the excessive competition now everywhere prevalent may thwart even a modest half-way measure.

But with cars as they are—that is, with just enough furniture cars floating around to encourage shippers to demand them, and most of these cars being too light to carry a full load of heavy freight—that is, a load of such bulk as a shipper would naturally put into them—the problem is to keep them busy in the transportation of light and bulky freight, while not making the rates in these so much lower than the rates for the same goods in smaller cars as to lead shippers to demand them for everything. As it is now they want large cars for almost every kind of freight lighter than pig iron. The simple solution is to raise the rate in the large cars or reduce it in the smaller ones. If the traffic men say that they can do neither, let them acknowledge the responsibility for the present bad state of affairs and take the necessary precautionary measures to prevent things growing any worse.

We cannot see how the recognition of the cubic-capacity basis affords the slightest warrant for abolishing the difference between carload and less than carload rates. As long as it is for the interest of the carrier to have all cars run full, it will be necessary to offer some inducement to the shipper to load them full. What percentage of the total amount of furniture, carriages, machinery and other bulky articles would be shipped in partial loads if there were no pecuniary inducement to fill the cars, we do not know; quite likely it would be small; but however small the percentage, the absolute loss would continue forever, and all to no profit. The difference between carload and less than carload rates ought, however, in most cases, to be much smaller than it is. It is true that 12 tons, a full load for an old car, is only part of a load for a 30-ton car; and this complicates the matter of adjusting C. L. and L. C. L. rates; but this does not warrant the abandonment of all attempts to have freight shipped in ful carloads.

In considering the tariff perplexities which have arisen from the use of fictitious weights for bulky goods, many of the participants in this discussion seem to forget that the assumed weights prescribed in tariffs are simply blind methods of estimating the cubic capacities of cars. When 20,000 lbs. was fixed as the arbitrary weight of a carload of furniture, the meaning was, simply, that a car carrying five tons of furniture should not be hauled for any less money than the same car carrying ten tons (all the weight it could carry) of ordinary first-class freight. The first road that built cars of larger dimensions, while leaving the weight limit the same, simply effected a reduction in price to the shipper. The railroad saved money by building the large car and then gave the whole of the saving to the shipper, instead of retaining, as it should, nearly or quite the whole for itself. To reduce the weight limit now would be simply a reduction in the price. Those who demand a reduction in the weight limit for the purpose, as they say, of substituting honest figures for dishonest, should in all fairness advocate a coincident advance in the rate per 100 lbs. If,

with the reduction in minimum weights, we can at once destroy or sequestrate all the extra-large cars, well and good; but to bother with the differences between actual and estimated weights, while leaving the selection of cars to the sleight-of-hand methods of soliciting agents and sharp shippers, is to follow the shadow while losing the substance. The essential question in each shipment of bulky freight hinges on the price per cubic foot, and any settlement which ignores this is worthless.

The Steam-Trolley Contest in Connecticut.

A most important decision in its bearings on the competitive relations of steam and electric railroads in Connecticut has just been rendered by Judge G. W. Wheeler in the Superior Court of that state. It has been appealed to the Supreme Court of the state, but the findings of the lower court are in such a form that, as regards the particular case, the decision seems fairly sure of being sustained.

Some two years ago the Central Railway & Electric Company of New Britain planned a trolley line for the distance of about nine miles between New Britain (population about 22,000) and Hartford, with a population of about 62,000. The new line would have paralleled both the Consolidated and New England companies' steam tracks between the two cities. The general street-railroad law of the state in such cases requires a Superior Court judge to pass upon the question of public necessity and convenience, and, after a stoutly fought suit, Judge F. B. Hall, in April of 1895, ruled on that point adversely to the trolley corporation. But this was hardly more than the opening skirmish of a long legal campaign. The New Britain company joined with the Hartford Street Railway Company, the most powerful trolley corporation in the state; both together took control of a third company, with a separate charter covering territory between the two cities; a fresh lay-out was made, with right of way largely through private land, and a new legal conflict ensued. Its manifold phases and intricacies need not be traced here, but the fact that, at the last, only with the utmost difficulty could a judge be found to try the case, indicates sufficiently its character.

The long litigation has just reached a climax, or sub-climax, with the decision of Judge Wheeler, who has ordered an iron-clad injunction against the proposed trolley parallel. On its face the decision turns upon points largely technical—the defectiveness in the matter of the charters of the three trolley companies, the validity of the steam companies as parties to the suit and the partial, but legally sufficient, occupancy of a highway by the proposed parallel. But in the finding of facts accompanying the decision the Judge goes much further, accenting the earlier decision of Judge Hall and the sparse population along much of the proposed parallel and consequently its essential character as a parallel between two cities and nothing else.

In more general terms the decision seems to imply strongly that the Connecticut courts will be strict constructionists of the loose trolley charters, that the public necessity and convenience of trolley roads must be invariably proved and well proved and that, in such proof, a well-settled region between the two points of competition is an important factor. Should the decision hold, its value to the steam-railroad interests of the state is obvious, and indeed it forecasts fresh controversy of steam and the trolley in the state legislature over some of its legal consequences.

In these columns about a year ago were described some of the features of the complex contest between steam and trolley which has now been waged for several years with Connecticut as a battle-ground. During the year there has continued with considerable legal asperity the struggle of the trolley companies to push through competing parallels, especially between cities, and the equally strenuous resistance of the steam companies, differing in legal name, but all essentially merged in the Consolidated Railroad Company. The state contains 17 towns which have cities within the town limits (though in a few cases city and town are co-terminous), and 23 miles spans the longest distance between any city and the city which is proximate, the average distance being about 12 miles; yet, strange to say, at the end of a conflict of more than four years' duration, no two of these cities have been connected by new trolleys competing with a steam road and which have been constructed during that time. Indeed, it does not strain the fact to say that trolley competition of an inter-urban character does not exist in the state, so successful has the Consolidated Company been in resisting the new rivalry in both the legislature and the courts. It is true that the small cities of Ansonia and Derby have trolley connection, but the two municipalities, are geographically one as are Norwalk and South Norwalk, which are also joined by trolley lines, and, in the case of the cities of Stamford and South Norwalk, the Consolidated Company owns the trolley system of the former city and has consented to connect with a Norwalk line only from motives of policy. The trolley lines connecting those two cities can only be deemed competing parallels on the paradoxical theory that the Consolidated Company is a competitor to itself.

The situation in Connecticut may, perhaps, be expressed more vividly by stating that from 12 out of the 18 cities of the state no competing trolley line runs to any other city, and that the 12 cities referred to include New Haven, Hartford, Bridgeport and Waterbury, the four larger municipalities of the Commonwealth.

This may justly be described as a strained situation, and the strain has many places of acute tension, where something must sooner or later give way. One of those places, namely, the area of proposed parallelism between New Britain and Hartford, is referred to in Judge Wheeler's decision. A second is between New London and Norwich, inclusive, where a flaw in the organization of one of the associated trolley companies has blocked a trolley parallel, and the appeal from the lower court to the Supreme Court of the state was argued at Norwich a few weeks ago. There is also a danger signal for the Consolidated Company in a suit brought before the Superior Court of New Haven County to determine the public necessity and convenience of a projected trolley to connect New Haven with Derby and Ansonia and parallel the old New Haven and Derby steam road, now a part of the Consolidated Company's Berkshire Division and a very large local passenger carrier. In some other directions new trolley parallels are nearly or quite accomplished facts. One is just about to be opened in the town of Enfield to Longmeadow and soon to reach Springfield, Mass. Another has pushed through to Talcottville, on the New England road, presumptively very soon to connect the city of Rockville with Hartford; yet another has just joined the city of Middletown with its neighbor, Portland, across the Connecticut River and is stretching northward toward Hartford. Altogether there were a year ago in the state 103 miles of trolley roads paralleling steam lines. There are now about 128 miles, showing that while the Consolidated Company has, on the whole, been singularly successful in the long campaign its "trocha" has, in places, been broken and the warfare is certainly far from ended. In the coming legislature that warfare seems likely to be continued with the utmost vigor.

The financial and other questions of serious moment forced on the Consolidated Company by its vast scheme of improvements, including the costly four-tracking, the Boston terminal scheme and the recasting of the New England management, have, for the time, somewhat diverted its management from electric schemes of its own. It has acquired recently no additional trolley roads and, beyond developing plans on the Nantasket branch and its Stamford plant, and in the suburbs of Boston, its policy has been defensive rather than aggressive. Perhaps this has been due to the fact that not only has its largely increased freight traffic more than made good losses from trolley competition, but those losses themselves have been somewhat less than were feared. The road carried in the fiscal year ending June 30, 1894, a total of 44,448,324 passengers. The number was reduced, presumptively by trolley competition, to 43,838,676 passengers for the year succeeding, but the figures rose slightly last year to 43,970,932, a number, however, considerably below the figures for 1894. On the whole, therefore, the competing trolleys seem now to be cutting off what would probably have been gains in local passenger traffic rather than making very positive inroads on traffic of the kind already existing. But the time is hardly remote when the great corporation must turn sharper attention to the electric competitions, present and prospective, and events in the Connecticut Legislature soon to meet may force its hand. If not, then the hottest struggle will come when inter-urban competition develops in the state. It is a thing that must apparently be faced sooner or later and, when it comes, if the Consolidated Company carries out its suggestion of electrical equipment of one of its multiple tracks, the new rivalry with "express service" as an element will supply some instructive results. That, indeed, was the method by which the Consolidated Company has proposed to meet the threatened rivalry between New Britain and Hartford, now postponed by Judge Wheeler's decision, but hardly thwarted. The situation in Connecticut is only a more highly developed and organized form of what is found to-day in half a dozen other regions; and it sums up in a compact way one of the most formidable set of questions now before the railroads.

October Accidents.

Our record of train accidents in October, given in this number, includes 72 collisions, 62 derailments and 7 other accidents, a total of 141 accidents, in which 49 persons were killed and 89 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

Collisions.	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	13	0	0	13
Misplaced switch	5	0	1	6
Failure to give or observe signal	2	1	0	3
Mistake in giving or understanding orders	0	6	0	6
Miscellaneous	8	4	9	21
Unexplained	7	8	8	23
Total	35	19	18	72

Derailments.			
Broken rail	1	Misplaced switch	2
Defective bridge	1	Unfastened switch	1
Defective switch	2	Engine left unattended	1
Broken signal light	1	Open draw	1
Broken wheel	3	Derailing switch	1
Broken axle	8	Animals on track	1
Broken truck	1	Landslide	2
Fallen brakebeam	1	Malicious obstruction	5
Brakehose burst	1	Accidental obstruction	1
Broken car	2	Unexplained	22
Failure of drawbar	3		62
Explosion	1		

Other Accidents.	
Boiler explosion	1
Cars burned while running	1
Various breakages of rolling stock	3
Other causes	2— 7
Total number of accidents	141

A general classification shows:

	Collisions.	Derailments.	Other accid's.	Total.	P. c.
Defects of road	0	5	0	5	4
Defects of equipment	13	20	4	37	26
Negligence in operating	56	6	1	43	30
Unforeseen obstructions	0	9	2	11	8
Unexplained	23	22	0	45	32
Total	72	62	7	141	100

The number of trains involved is as follows

	Collisions.	Derailments.	Other accid's.	Total.
Passenger	32	10	6	48
Freight and other	95	52	1	148
Total	127	62	7	196

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accid's.	Total.
Killed:				
Employees	17	10	0	27
Passengers	9	0	0	9
Others	6	7	0	13
Total	32	17	0	49
Injured:				
Employees	38	15	2	55
Passengers	21	5	0	26
Others	5	3	0	8
Total	64	23	2	89

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road	0	2	3	1
Defects of equipment	0	0	4	5
Negligence in operating	9	21	17	40
Unforeseen obstructions and maliciousness	0	0	0	4
Unexplained	0	3	3	7
Total	9	26	27	55

Twenty-three accidents caused the death of one or more persons each, and 32 caused injury but not death, leaving 86 (61 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with October of the previous five years shows:

	1896.	1895.	1894.	1893.	1892.	1891.
Collisions	72	60	92	132	96	120
Derailments	62	64	81	116	91	91
Other accidents	7	7	9	12	6	13
Total accidents	141	131	182	260	196	224
Employees killed	27	40	25	45	47	42
Others killed	22	9	19	52	15	16
Employees injured	55	73	107	140	83	100
Others injured	34	100	102	188	79	79
Passenger trains involved	48	40	65	99	62	67
Average per day:						
Accidents	4.55	4.19	5.87	8.39	6.32	7.23
Killed	1.58	1.52	1.42	3.13	2.00	1.87
Injured	2.87	4.94	6.74	10.58	5.23	7.77
Average per accident:						
Killed	0.35	0.36	0.24	0.37	0.31	0.25
Injured	0.63	1.18	1.14	1.26	0.82	0.79

Seven passengers were killed in one accident in October, that at Windsor Springs, Mo., on the 25th. This collision, as also that at Swansea, S. C., was reported in the *Railroad Gazette* of Oct. 30. In the Windsor Springs case it appears that the train which was at fault the westbound, when on time—that is, usually—passes Valley Park before the eastbound train, which is made up at that point, starts out, in fact before it is made up; so that the conductor and engineman do not have the daily sight of this opposing train to remind them of its existence. The only semblance of an excuse offered by the engineman was that, having a heavy load of excursionists, who were liable to be too late for their festivities, he was anxious to make up the 45 minutes that had been lost. This seems to be a bad case of trusting to habit and custom.

Two passenger trains had pretty narrow escapes from disaster, those at South Norwalk, Conn., on the 27th, and at Lynn, Mass., on the 30th. At the former place

the derailing switch kept the train from reaching the drawbridge while in the latter there appears to have been nothing in the shape of derailer. Another case where an engineman ran past a danger point, that at Boston, on the 1st, appears to be chargeable neither to the engineman nor the signalman, and we have classed it as due to defects of road, the signal being a part of the road. This accident will be of interest to those who think that they never heard of a train getting into trouble because white lights are used to indicate all clear.

The cause of the wreck at Philson, Pa., on the 1st, seems to have been undiscoverable. There were a number of tramps on the train, and in the first newspaper reports they were accused of shutting off the air connection between the engine and the train, but we do not learn that the officers of the road find any evidence that such was the case. At the same time, there seems to be no doubt that the air valve was closed, while the trainmen all assert that the brakes were properly tested before the train was started.

Among the other paragraphs in the record which, for one reason or another, are of peculiar interest, are those from Peterton, Kan. (1st); Larue, O. (9th); Buffalo, (13th), and Argentine, Kan. (7th).

Street car accidents (all electric cars except two or three cases on cable roads) were quite numerous in October. We find accounts of five rear collisions, five butting and three miscellaneous; then we have four cases of engines running into electric cars and one of a trolley car running into a freight train; there were two runaways and three other derailments, making altogether 23 accidents, in which seven persons were reported killed and 57 injured.

October Grain Exports.

The government report for October and for the 10 months since Jan. 1 shows exports of corn, wheat and oats, from the principal Atlantic and Gulf ports as follows (*thousands* of bushels):

	October		Ten months	
	1896.	1895.	1896.	1895.
Baltimore	4,582.6	942 8	28,981.6	9 766.7
Boston	1,732.6	1,368.7	44,082.0	8 215.5
Newport News	821.3	317.1	11,570.0	5,093.1
New York	4,7o0.3	5,373.1	43,759 3	33,048 8
Norfolk	996.2	316.0	10 356.0	2,446.7
Philadelphia	1,267.8	592.2	10,733.7	3,663.5
Galveston	1,802.0	31.4	7,301.1	34.3
New Orleans	4,070.6	886.8	23,498.1	4,676.7
Total	20,036 4	9,831.1	150,291.8	66,945.3

The exports of corn from New Orleans last month were 3,185,212 bu., being more than twice as much as those from New York, and just about equal to the amount shipped out of New York in October, 1895. This year Baltimore exported 2,673,815 bu., more than three times as much as last year, and far ahead of New York this year. The total exports of corn in October from all ports were nearly thirteen million bushels, of which over two millions went from miscellaneous ports not specified in the report. The exports of wheat from New York are about the same as last year, but this is not very encouraging to New York, for all of the other ports have enjoyed large increases. This year Galveston shipped 1,300,000 bu., having shipped none at all in any month of 1895. From Newport News the exports of wheat this year have been insignificant, whereas in 1895 to Nov. 1 there were exports of over three million bushels.

Taking the three grains together, New York, it will be seen, still leads, with Baltimore second, and New Orleans third; but it is not a very proud leadership, for the changes from last year are enormous: New York loses, and all the others show great gains.

The Lehigh Valley has put on a daily sleeping-car between New York and Wilkes-Barre, Pa., 176 miles. The eastbound car starts from Wilkes-Barre, at 3 o'clock in the morning, the car being opened at 10 o'clock the night before. This, of course, will be a great convenience to passengers making this trip. No one likes to get up at 3 o'clock, and yet heretofore a Wilkes-Barre passenger could not be in New York in the morning unless he did this, or else started at 5:33 the night before. But this brings up a practical point which has often interested us in similar service. How will the sleeper be ventilated? It is a fine thing to thus be enabled to get a full night's rest; but to sleep four or five hours in a car which stands on a side-track and then finish out the night on the road implies a need of skillful ventilation. In summer in many places, this arrangement is intolerable; the heat in a car which lacks the draft produced by rapid motion is so great that one would prefer to forego the benefit of the bed. In cold or moderate weather the nuisance is foul air, instead of hot, and most of us ignorantly or carelessly put up with it; and the clergymen, milliners and farmer boys who flood the patent office with ventilating devices have not yet helped us out. In the absence of any special device the porter is our only resource. He ought to see that the openings for fresh air, if sufficiently large when the car is at rest, are very much contracted when it starts on its journey; but whether he can do this satisfactorily without access to one of the windows of each berth, is doubtful.

In France, as here, shippers of live stock are entitled to the free passage of attendants to take care of the cattle. Now the French Beekeepers' Union rises in its might and declares that this is an undue preference; the privilege must be extended to shippers of hives of bees. For these an attendant is indispensably necessary in order to water the bees and ventilate the hives, and care for the loading and unloading, which only an expert can attend to. The matter has come before the Minister of Public Works, who has sent a circular letter to the railroad companies asking what they think about it. Hives of bees, we imagine, do not form a common object of freight in this country, at least not in carload lots, and we suppose that not even a beekeepers' society would claim a free pass (with return) for the shipment of one hive of bees.

The remarkable attack of the Kansas populists on the Atchison may prove to have had its origin in nefarious motives and not to have been the simple folly of cranks. Mr. Walker, the Chairman of the Board of Directors of the Atchison, says quite definitely and explicitly that it was a stock-jobbing conspiracy. It was originated by a group of obscure and irresponsible men who counted upon the pliability of populistic judges, and who began bear operations in half a dozen markets. We know certainly that they produced some alarm, even in New York City, and among men who ought to have known from the first that the movement was preposterous. It is probable, however, that the net result will be a great deal more injurious to those who originated the speculation than to the Atchison.

NEW PUBLICATIONS.

Locomotive Mechanism and Engineering. By H. C. Reagan, Jr. New York: John Wiley & Sons.

The impression gained from the title-page of this book, and from a careful reading of the preface, is that it was written to serve as a semi-text book in lodge-rooms and for use by ambitious firemen and engineers. It is unfortunate that so many men consider themselves qualified to write for beginners who would never dream of addressing themselves to experts, being quite unmindful of the fact that no one but an expert is really qualified to write for beginners, or to act as a demonstrator to those who are still struggling with the rudiments. This is one reason why so many useless books are written for firemen and engineers; the brain of the writer has not been trained to think clearly and consecutively; and this is also the reason why so many engineers and firemen tire in their attempts at self-education and give up in a sort of hopeless despair.

The author of this book announces that he is a locomotive engineer, and he doubtless knows enough about his engine to run, keep up steam, make repairs and give satisfaction at headquarters; but this is very far from qualifying him to write a book on the subject. From the first he betrays his lack of training as a writer and thinker. Ideas do not follow one another consecutively, and his explanations are not clear. To the expert they must appear incomplete, to the beginner hazy and beyond his comprehension; he takes too much for granted for the latter and not enough for the former. It is not true to say that he makes false statements, but misstatements or rather incomplete statements abound, as though he had crammed for the occasion and was writing up to the full limits of, or perhaps just beyond the limits of, his own knowledge. Thus, in one of the series of questions it is asked, "How are the steam cylinders made" and "what are the names of the three parts of a cylinder," to which the answer is given, "cylinder, steam-chest and saddle"; from which the novice would inevitably infer that the steam chest is cast solid with the main body of the cylinder. This is a minor matter, perhaps, too small to be mentioned were it an isolated case, but all of the early chapters abound in just such incomplete statements, which, without being absolutely untrue, are misleading.

Another great defect in this book is the careless English. If there is any one class of men who should have good English written for them it is men of limited education and of this the book under review certainly cannot serve as a model.

In this, the second edition, an addition has been made in the shape of an electrical appendix, where the writer is evidently beyond his depth, but where his English is better, and for this he gives due credit to others. But that it is absolutely useless to, and beyond the comprehension of, the men to whom it is addressed is evident. No elementary instruction is offered, but the reader takes a straight plunge into electrical nomenclature of the most abstract character. There is no attempt to simplify descriptions which one must be well versed in electricity to understand, and we suspect that the author would hesitate to explain his own explanations.

It may safely be said that there is not a topic in the book which has not been handled more simply, clearly and concisely elsewhere, but, defective as the book is in its composition, it is but fair to admit its good points. The scheme of treating a subject and then following with a series of questions and answers is good. The handling of the air-brake is the best portion of the book, and the reader sees it to have been taken from the Westinghouse Instruction book. Here the explanations are all that could be desired. In the chapter devoted to compound locomotives, a brief description is given of the several types that have been exploited in this country, and the book can well serve as a convenient reference to the various pieces of mechanism that have been designed to act as intercepting valves and for the distribution of steam in this form of locomotive.

The [Pocket Companion, edited by F. H. Kindl, C. E. (the Carnegie Company, Limited, Pittsburg, Pa., Price, $2.00), has again made its appearance with a flexible morocco binding which now bears the date "1897." The 1893 edition has been revised and much matter added, making a book of 305 pages. Former edititions of the work are too well known among engineers to need any recommendation from us. The same arrangement of matter has been preserved and the same illustrations appear again. The first part of the work is taken up with descriptions and illustrations of the different types of the Carnegie beams—especially I beams and girders. The last part abounds in tables, which are useful to those engaged in structural work of any kind. The tables appearing on pages 105-120 giving the properties of standard bars and beams are especially valuable. One of the commendable features of the book is its complete index.

Electric Traction Under Steam Railroad Conditions.

[*Continued from Page* 807.]

Again, it is essential that, on the road, speed be regulated by better means than a rheostat. A series motor varies its speed with the load and so cannot run without rheostatic regulation at a given speed if for any reason the number of cars in the train or the track resistance varies. It will, therefore, be necessary to return to commuted series field coils or equivalents, and it will be, perhaps, desirable to have a shunt winding which can be used to give still closer regulation. In fact, shunt motors are being introduced abroad for traction purposes. The use of these devices will increase the weight of the motors compared with simple series wound motors, for the simple reason that with the field reduced to the utmost it must still be sufficient to prevent sparking, and there must be sufficient iron employed to make the stronger field efficient when it is desirable to run slower. These considerations make more room desirable for the motors than can be provided in the trucks of an ordinary car.

For these several reasons it is predicted that the high speed electric locomotive of the future will, like the steam locomotive, be a structure independent of the train, that the motors will be hung on the frame independent of the driving wheels and the same as well as the driving wheels connected by side rods. To obtain proper room under such conditions larger driving wheels will be employed than the wheels of an ordinary car. This will so extend the wheel base that it will not be safe to run at high speeds without the leading truck the same as on an ordinary locomotive, and in fact the electric locomotive will in all its general features be a steam locomotive without the boiler, with motors substituted for the steam cylinders. In this way and probably in no other can the flexibility of the present steam locomotive be obtained. Probably there will be greater difference of opinion on this subject than on any other. The use of motors in the trucks of baggage cars is so fascinating that strong efforts will be and should be made to retain such a system, though the reasons stated are believed to be sufficient to prevent its general adoption. Again, it is desirable that the whole locomotive be a unit, on a strong frame calculated to resist the shocks due to collisions and accidents, and it is doubtful if locomotive drivers will be found who will be willing to risk their lives on any other kind of a structure.

To realize the flexibility of the ordinary locomotive one has but to go on the line of one of the roads which has not yet adopted the heaviest type of rail, but yet runs express trains at 45 miles per hour, grasp a convenient post close to the line and a little around a curve, if possible, where one can take the wind of the train and watch its approach. In many cases the locomotive sways nearly a foot from the perpendicular, first one way and then the other. At a bad joint the plunge is so rapid that the effect can be described as terrific, as one cannot but think of the consequences if such a mass should leave the rails. The locomotive, however, follows the inequalities as readily as would a farm wagon. Electrical engineers may insist upon a more rigid and better track, but this will require additional expense and will not entirely overcome the difficulty. The electric locomotive must be constructed so that it will do the work of the present locomotive in the same way, and the feature of flexibility cannot be sacrificed.

A modern heavy locomotive costs about $10,000 which is at the rate of $10 to $12 per horse power, on about the same basis as electric motors would be rated. It needs little argument to show that an electric locomotive to take its place under conditions stated would cost fully as much. Moreover, if like care is to be taken of electric locomotives as of those for steam, the same number must be employed of like capacity for like work.

An approximate calculation of the cost of electrically equipping and operating a trunk line has been based on information in regard to the operating expenses of different railroads, given in the series of articles by Mr. Baxter, in the *Electrical Engineer*, early this year. We have the highest respect for the industry and ingenuity of Mr. Baxter, but we have been obliged to entirely disagree with his conclusions. For instance, we calculate that the cost of the steam and electric generating plants will be about three times as much as he states, the transmission plant and sub-stations about twice as much, and the operating expenses about 5½ times as much as he provides for. Necessarily the conclusions are diametrically opposite.

The calculations are based on the operating expenses of a railroad system, comprising nearly 2,700 miles of road and employing 1,800 locomotives. By calculations based on the train miles, checked by the reported coal burned and the probable number of engines in use, Mr. Baxter ingeniously determines an average of 140,000 H. P., considered as continuously operated, which, in our calculations, we estimate will require to replace it 280,000 H. P. in the stations, on the basis of 50 per cent. efficiency from stationary engine pistons to track, and if 60 per cent. can be obtained by commuted fields, or other means herein discussed, the difference simply provides for an expected increase of travel. From the probable average power and the actual reported operating expenses corresponding thereto we proceed as follows: For facility of calculation and to obtain an underestimate, rater than one too large, the power required for the switching engines is distributed among the regular trains on the road. It is also assumed that the average number of trains is continued the entire length of the road instead of using a much greater number than the average for suburban travel. These methods cause an underestimate of the cost of the electric transmission, but enable the cost of operation to be accurately worked up from the average. The latter is the more important point, as the other merely involves comparatively small questions of difference in the amount of interest. By this generalization the trains

will be assumed as separated about 7½ miles, independent of direction, over the whole length of the road for every hour in the year. On this basis there will be required on the average, 106 station horse-power per mile of road, independent of direction of trains, but to provide for concentrations which will inevitably occur, the generating plants and transmission lines have been worked out on the basis of 150 H. P. per mile. The assumed number of trains will require on the average about 400 H. P. each at track, or 800 at station, which is high for an average, as the power of the switching engines is, as explained, distributed along the whole line for convenience of calculation on the basis of averages. To obtain the economy due to fairly large stations they are assumed to be separated 45 miles from each other, and at two intermediate points transformers and rotary converters (transformers) located, by which means the feeders are supplied every 15 miles. On the above basis it is assumed that 6,750 H. P. is installed at each steam station, and 2,250 H. P. at each sub-station. To avoid overestimates the cost per horse-power of steam and electric plant in main stations has been assumed as only $80 per horse-power with $20,000 for buildings, and for the whole apparatus in the sub-stations there has been allowed only $10 per horse-power and $10,200 for buildings and the copper in the high-tension lines. The low-tension copper has been worked out on the basis that half way between the main and sub-station two trains may meet, each requiring 1,000 H. P., and that a uniform section of copper sufficient to carry 7½ miles, the current required for half of this power, at an original tension of 700 volts and a drop of 20 per cent., would be ample for the whole length of the low-tension lines. On this basis the cost for copper at 13 cents per pound for the outgoing low-tension conductors will be $12,386 per mile. It is assumsd that provision for supporting the outgoing conductors and the bonds in main track for return current will cost $5,000 per mile. On the basis of these prices, without considering incidentals, the total cost of the electrical generating and transmission plant foots up $31,057 per mile, the annual interest on which at 5 per cent. is $1,553 per mile. If the services of the 1,800 steam locomotives can be furnished by 1,500 new electric locomotives at $10,000 each, the same will cost $5,556 per mile, requiring $278 annual interest per mile, making the total interest on steam and electrical plants, including locomotives, $1,831 per mile, The operating expenses of the station considered as a steam station only, from Emery's tables reduced to 24 hours and 365 days, modifying cost of plant and eliminating coal and interest, is found to be $25.84 per average horse-power per year. The time of 12 extra men for care of electric apparatus in the main and two sub-stations amounts to $2.75 per horse-power per year, which makes the total operating expenses of the generating, transmission and locomotive plants, exclusive of coal and interest, $28.59 per average main station horse-power per year, or $3,031 per mile, or with interest added, viz.: $1,831 as above, a total of $4,862 per mile. The operating expenses of the station thus calculated include an allowance for repairs, insurance, taxes and renewals. It should be recollected that the cost of coal has been already provided for in the percentage of saving first developed, and that the train expenses are assumed to be the same as for steam locomotives. The operating expenses of the road using steam amounted to $15,187 per mile. Of this, as previously stated, 6.56 per cent. will be saved by the use of electricity, corresponding to $996 per mile. This subtracted from $4,862 per mile (given as the of cost operating expenses of the generating stations, etc., with interest added), leaves $3,866 per mile per year as the additional expense which will be entailed by the application of electricity as a substitute for steam; so, on the basis that the operating expenses are 50 per cent. of the gross receipts, such gross receipts must be increased 12¾ per cent. by the introduction of electricity over the whole length of the line, in order to enable the road to pay the same dividends as before.

It may be considered that the results will changed materially by the use of high-tension transmission throughout. If tri-phase currents at a tension of 10,000 volts were received by each electrical locomotive, the tension reduced by transformers carried by the locomotive, and current employed to operate induction motors directly, or to operate direct-current motors through rotary converters also carried by the locomotives, the saving, independent of extra transformers and converters, would amount to $9,714 per mile, corresponding to $486 interest per mile, and reduce the total increased operating expenses to $3,380 per mile, which would require that the gross receipts be increased 10.2 per cent. in order to pay the same dividend as before, instead of 12¾ per cent., for combined high and low tension transmission. The saving in dollars is quite large, but the total costs are so enormous that the saving makes but a small difference in percentage. It will similarly be seen that differences in kind of apparatus employed will have very little difference on the general results, though the savings are important in themselves.

It must be recollected that these results are based on providing electric traction for the whole length of a trunk line It can hardly be expected that the gross receipts for the whole line will be increased, say, one-eighth, by such an application. If, however, the application be made within the radius of suburban traffic such an increase is not only probable, but it may be expected that the cost of operation per passenger-mile will be reduced in greater proportion than stated, so that the application of electric traction will pay from the outset. These considerations will apply to longer distances on railroads like the New York, New Haven & Hartford, where the passenger business furnishes the larger proportion of the income.

Again, it is possible to accomplish with the electric locomotive results that are impossible with the steam locomotive. The power for the former being generated originally in stationary boilers, or in some localities derived from waterfalls, is not limited and the power of the motor can be increased indefinitely, so that in particular locations a demand either for greater power to obtain more speed, or a greater or more continued tractive force than is now possible with a steam locomotive, can be met by electricity without difficulty.

On the whole, therefore, although the application to the whole length of long trunk lines does not seem practicable under present conditions, there is no doubt but that the industry will grow in the future as certainly as in the past.

BY MR. CHARLES K. STEARNS.

The information obtained from the operation of the Nantasket electrical line, during the summer of 1895, was more or less of a general nature, as the chief object in view from the standpoint of the railroad officials was to demonstrate that an electrically equipped road could be operated as satisfactorily in regard to the facility of handling large numbers of passengers on time, as a steam road.

The train schedule of July, 1895, called for an average of 148.1 trains per day, including Sundays, and in 1896, 66 trains per day including Sundays, an average of 68 trains per day. In 1895 those trains consisted of a sufficient number of cars to accommodate the people, but in 1896 the trains were limited to two cars, a motor car and trailer. To accommodate the passenger traffic, extra trains were made up and run between the regular scheduled trains. A fair average on Sundays would be about 150 trains, and week days 75 trains per day. This partially accounts for the difference in the coal consumption in 1895 and 1896, although in 1896 the engines were run condensing, while in 1895 non-condensing.

The following table, although incomplete, gives some idea of the operation of the power station during July, 1895 and 1896:

July.	1895.	1896.
Hours' run	60⅛	546¼
Average electric H. P. per hour	245	319⅛
Pounds coal burned	629.575	571,100
Coal per electric H. P. hour	4 24	2 99
Average trains per day	148.1	68
Average cars per train	2.1	2
Maximum cars per train	7	2
Train miles	32,803	44,173
Passengers	267,143	
Tons passengers	18,700	
Tons, dead load	162,089	
Tons, total load	180,789	
Per cent. paying load to dead load	10.2	

BY MR. H. WARD LEONARD.

A thing which I do not think enough stress has been laid on in the comparison is the fact that we have reached what appears to be practically a limit in the size and horse power of steam locomotives; whereas there is practically no limit, as compared to the present limit, in the horse power possible for electric locomotives, and since the thing which is of the greatest importance to-day in railroads is to secure, first, higher speeds, and second, greater hauling power, it seems to me that the electric locomotive has a very marked advantage in those lines. Take, for example, the steam locomotive which hauls the New York Central Limited and which has been pretty carefully tested between here and Albany. The maximum horse power was in the neighborhood of a thousand. The horse power that was developed while accelerating the locomotive to its full speed, and while the speed was at the rate of about thirty odd miles an hour, was about 600 H. P. The steam pressure fell very rapidly as the speed increased, that is to say, the mean effective pressure in the cylinder, and and this is a trouble which is met with in steam locomotives which will be absent in the electric locomotive. There is a very marked falling off in drawbar pull due to the inability of maintaining a high mean effective pressure in the cylinder of the steam locomotive which would require considerable modification from present types before it can be avoided, it being due to the limitation of rapidity of admission of the steam and one or two other considerations. The maximum weight on drivers that steam locomotives have is, of course, the limit to their hauling power, and that very rarely exceeds about 170,000 lbs., and with the electric locomotive there would be no difficulty in making that weight almost anything desired.

BY MR. A. E. KENNELLY.

It is contended that if we could replace the steam locomotives of the present time by electric locomotives that we could economize—that we would show an economy by reason of the saving in fuel. Now I never saw any engine that it was claimed would produce a horse-power on say 2 lbs. of coal per indicated horse-power. I have always understood that it took five and six. I will assume that for the present time they do take 5 and 6 lbs. of coal on an average throughout the country. The fuel expenses of the roads throughout the country are stated in the statistics to vary from 7 per cent. to 13 per cent. of the total operating expenses, and we may take an average of say 10 per cent. of the total operating expenses as covering the cost of the coal, and perhaps also the cost of the water supply. Assuming that we had some kind friend who would take a steam railroad and give us an electric locomotive to-morrow for each steam locomotive, having the same power and being worth about the same amount of money, and also providing the plant and conductors whereby that system could be operated, we should be able to throw out all the tenders, and that would be a considerable saving, no doubt. We should save 25 tons or so to every train, and that would enable us to haul a larger load of freight and carry perhaps a little higher speed with safety for passenger service. The difference in coal consumed might amount to as much as 12 per cent. upon the passenger trains. It might amount to only three or four per cent. on freight trains. But suppose it averaged about six per cent. We should have a saving of fuel of about six per cent. simply by displacing the tenders. The steam plant situated in a central station might possibly, let us say, generate an indicated horse-power on two pounds of coal—I fancy that it would be safe to allow three to meet average conditions of variable loads. With three pounds of coal per horse-power hour at the central station for the transmission system we should probably expect to develop a horse-power hour at the shafts of the electric locomotive for about 5 lb. of coal per indicated horse-power hour. We should therefore be very little better off than we are at the present time with good steam locomotives. Even if we succeed in bringing the coal consumption down to 2 lb. per I. H. P. hour, we could not expect to develop a horse-power hour at the locomotive shafts for less than 3⅛ lbs. We should, however, have a greatly increased plant, a much larger inspection and much greater fixed charges, and we could not, so far as I can see, expect under the conditions of railroad traffic of to-day to see any saving effected.

If it can be demonstrated that an electric locomotive can safely carry passengers at say 100 or 120 miles per hour, I think there is a very large field open for the electric locomotive on the lines of high speed. It may cost more, but it is very probable that people would be ready to speend more for high speed passenger service. The conditions at such speed would be radically different, the problem presented, would be so different, the number of cars per train and the character and style of the cars so different that a new problem is presented, and on those lines I think there is a future for the electric motor. But on the lines of the present steam locomotive and the mere substitution of electricity for steam, I do not see where we can claim an advantage.

BY MR. C. F. MEBELACKER.

I think it is getting narrowed down to a question of what form of transmission we will use in order to get energy from the coal fields to the point where manufactures concentrate. We have several before us. We have heard a good deal about compressed air in the last few months. I have been looking it up as carefully as I could, but I cannot find very many data about it. As applied to street railroads, the best I have been able to find were in a letter of Mr. Ira Harris, written to the *Railroad Gazette*. He concludes that air can be compressed at about six cents per thousand cubic feet of free air, and that it is going to take to run an ordinary street car about 417 cu. ft. of free air per mile at the speed we ordinarily run. That looked to me very much like about 2½ cents a car-mile for power, and I do not think we are prepared to take power at that rate just at present. I think a fair average for electric work would be about a cent a mile. That is what it costs our road—a little under perhaps. I think the conclusion so far as compressed air is concerned, would be obvious under those conditions. We have the explosion motor of various kinds and descriptions, but there does not seem to have been enough progress made in that to tell what the outcome would be if it was put in large units. Probably the most promising thing is the gas motor, and the distribution of gas for power purposes through a piping system. The piping-system is not a thing that we look on with very much favor as compared to a copper circuit—rather more trouble to keep in shape.

If, then, we come down to the question of transmission of the energy to the manufacturing centers from the coal fields by electricity, it would naturally follow that the roads carrying the freight between those centers would adopt that power, too, and it would come down more to a question of what variation we would have to make in our present practice to adapt that power to long hauls. The first thing that would strike us is that we could not very well go at it in the hammer and tongs manner that we do in electric railroading. That is, we cannot put in power enough to start the whole road at once, if necessary. It is altogether too large a problem. The excess of power we would have to provide would run into too big a figure altogether—both the excess capacity of the line and the excess capacity in the power-house. The only way in which we can overcome that at present is by the use of the storage battery. Of course, the nearer we get to the point where the power is actually used, with the storage battery, the more we save in the capacity of the line and the station. Putting the battery on the locomotive itself we save in the capacity of station and line both, and approximate very nearly the ideal line. At the same time we cut down the enormous fluctuations which would result from the use of electric locomotives on a line where no such provision is made.

Let us try to imagine once the conditions which would exist without such provision for fluctuations, if we have, say, five or six switching engines in the yard moving around at once, and perhaps the Chicago Limited moving out and getting up speed as fast as possible, and four or five locals pulling out of the train sheds. It would take about 6,000-H. P. plant, and altogether it would make fluctuations from about 10 units that the load on that plant would be depending on. They would be accelerating, shutting off and accelerating again, continually. It strikes ms that the ammeter would want to give up its job in disgust; in fact, an attempt to work with electric power under those conditions I think would be out of the question, and it comes down to the question of a suitable storage battery to be used on the locomotive.

[Further report of this important discussion will be made in a future issue.—EDITOR.]

Speed Trials of a Screw-Propelled Ferryboat.*

The performance of the screw-propelled ferryboats now in service has been so satisfactory that, in providing the equipment for a new ferry from its terminal at Jersey City to Twenty-third street, New York, the Pennsylvania Railroad Co., decided to adopt the same method of propulsion. The service will require boats as fast as can be consistently operated in a harbor as crowded as the lower North River, and a speed equal to 15 statute miles per hour was decided upon. To determine the power required to propel such a type ferryboat at this speed, progressive speed trials were made with the screw-propelled ferryboat Cincinnati; incidentally, data were taken to determine the efficiency of this system of propulsion.

A distance of 5,600 ft. was laid off in the North River, extending from 94th street to 115th street. There is a depth of seven fathoms, and the course is so located that projecting points of land beyond the course act as range marks, so that a boat can be steered back and forth, at uniformly the same distance from the shore, through the same strength of current, and in a straight line.

Runs were made on this course, with and against the tide, at speeds varying from 6 to 13 statute miles per hour; one series with the two screws in operation, one at the bow and one at the stern; one series with the bow screw removed and stern screw "pushing," and one series with the stern screw removed and the bow screw "pulling."

The speed of the boat was held uniform by governing the speed of the screws—in other words, by running the engines at a constant rate of revolutions per minute—and four runs, two with and two against the tide, were made at each predetermined speed of screw; the time of entering and leaving the course was noted with a stop watch, and the final mean of the four observations taken as the mean speed; two sets of indicator diagrams were taken from the engine cylinders while on the course, the indicated H. P. calculated, and the mean of the several runs accepted as the indicated H. P. for the observed mean speed.

The indicated H. P. given is that devoloped by the main engines only, and does not include the air, circulating or feed pumps.

To determine the efficiency of the system, the screws were removed and the boat towed over the measured course, twice with and twice against the tide, at three different speeds and the tow-line strain measured by a dynamometer.

It will be noticed that the ratio of the power put into the engine to the actual resistance of the boat at nine miles per hour is 43 per cent. when two screws are in use 60 per cent. when one screw is pushing, and 40 per cent. when one screw is pulling.

The usual speed of this boat in ferry service is 11 miles

*Abstract of a paper read by Mr. F. L. Du Bosque, before the Society of Naval Architects and Marine Engineers, New York, Nov. 13, 1896.

per hour, and at this speed it requires 20 per cent. more power to propel the boat with two screws than with one screw pushing, and 69 per cent. more power to propel the boat with the screw at the bow than at the stern. If the same power could be put into one screw at the stern as is used by the two screws, the speed would be increased from 11 miles to 11.53 miles per hour. It is clear, therefore, that the bow screw is inefficient. When under way, it thrusts a column of water against the bow of the boat at a velocity equal to the slip ratio of the screw, and considerable power is absorbed through friction of the blade surface; but a ferryboat's bow becomes its stern at each succeeding trip, and it is, therefore, impossible to dispense with the forward screw.

DU BOSQUE ON FERRYBOAT SPEED TRIALS.

Speed statute miles per hour.	One screw pushing.			Two screws.			One screw pulling.		
	I.H.P.	Revs. per min.	Slip, per cent.	I.H.P.	Revs. per min.	Slip, per cent.	I.H.P.	Revs per min.	Slip, per cent.
9	250	91	19.5	332	87	20	443	105	35.5
10	364	103	24.5	464	97	20.5	638	118	36
11	520	115	27.5	624	107	19	880	135	35
12	720	128	28	816	116	18.5			

Speed in miles per hour.	Resistance, both screws removed. Pounds.	Indicated thrust.		
		One screw pushing. Pounds.	Two screws. Pounds.	One screw pulling. Pounds.
8	3,880	6,700	9,050	9,380
9	4,950	8,200	11,350	12,100
10	6,400	10,250	14,120	15,440

The screw at the bow, however, is useful to enable the ferryboat to start and stop promptly. Of the seven minutes required to go from landing to landing, two minutes are consumed in getting under way and stopping. Superiority in this respect is one of the reasons why a screw boat is preferable to a side-wheeler. A half minute is more easily gained in maneuvering by using screws than by increasing the speed of the boat when under way, and it is in stopping and backing that the forward screw shows its usefulness; it is able to thrust a column of water directly ahead that will not impinge against the boat.

The screw-propelled boat will eventually supplant the side-wheeled boat for ferry service, where certainty in the operation of the ferry is necessary, and where the comfort of the passengers is considered. As before stated, the boats are more quickly maneuvered at the landings, and in the winter they proceed through the ice without interruption, when the side-wheeled boats are very much delayed. A comparison of the power required to propel either type of boat shows results in favor of the side wheel. The Cincinnati (screw) and Chicago (side-wheel) are operated on the same ferry, and their speeds are about the same, 11 miles.

	I. H. P.	Displacement.
Cincinnati	624	952 tons.
Chicago	530	775 "

If the power required to drive these boats varies as $\sqrt[3]{\text{displacement}}^2$, and the boats were brought to the same displacement, then with a speed of 11 miles, this would be the result:

	I. H. P.	Displacement.
Cincinnati	624	952 tons.
Chicago	608	952 "

It can, no doubt be safely said, therefore, that the side wheel is a more economical propeller for a ferryboat than the two-screw arrangement, but it must not be forgotten that the advantages gained by the use of the screw are more valuable for the successful operation of a ferry than the amount saved in power.

The G. P. A. in Convention.

At the Atlantic City convention of the American Association of General Passenger Agents Mr. E. A. Ford, G. P. A. of the Pennsylvania Lines, made the annual address, and said a good many things of considerable interest and significance to the G. P. A.'s. We select the following passages which show the style of the address, and are of more than mere personal interest:

There should be no special arrangements made for excursions from our meeting points, because of the fact that it has become, to a great extent, the rule that the busiest general passenger agents may have during the year a set time for a vacation, and they therefore do not like to spend any additional time on an excursion upon the occasion of any meeting, but wish to have the privilege of returning home to their business if they may so elect. Other general passenger agents who are differently situated might attend the meeting, and then, with the transportation which is usually issued by the railway companies for them and their families to and from the meeting, they could by themselves, upon the ordinary trains of the connecting lines, make excursions to such points as they might wish to visit. But the railway companies having lines terminating at the points where the meetings may be held should not feel obligated in the future, as they seem to have felt in the past, to run a special excursion or a set of them to accommodate the general passenger agents and their families. It is an expensive burden which should be placed upon no company, and any company desiring to advertise its line or the territory occupied by it should do it in some other way and relieve the general passenger agents of the charge which has heretofore been freely made that their conventions are only for the purpose of getting together to participate in the "junketing" trip which usually follows them.

"He who lies down with dogs gets up with fleas."

In earlier times the reputation of the association meetings has been tarnished by the too free indulgence by some of its members in the "cup that cheers." There never was a law that a general passenger agent should not take a drink of liquor if he wished to do so. But there is a moral law now stronger than ever before that he shall not become intoxicated. And the fact that some of them did in times past indulge more freely than they ought to have done, most efficiently supported by the members of the "third house" who were accustomed to attend meetings, brought the association into reproach and justified the assertion made by managing officers and others that we met for frolic rather than for business.

This suggestion did not apply to the majority by any means. It pointed only to a smal. minority, who were long ago ashamed of their action, some of whom have passed into the great beyond, others of whom are still with us and have since done all they could by their example and correct habits of living to atone for the wrongs they had committed upon themselves and their families and their association, of which they were and are so proud.

The association has passed through many trials, not the least of which is the one I have mentioned. Its blemished name has kept some of its best members away from its meetings; but, thank Heaven, we are met to-day under new conditions. "Old things have passed away," and we may truthfully proclaim it from the housetops, if need be, that there is no set of business men upon the face of the earth to-day that, as a class, are more temperate in their habits and more circumspect in their conduct than general passenger agents.

TECHNICAL.

Manufacturing and Business.

The Boies Wheel Co., of Scranton, Pa., is working on full time in all departments.

The Dickson Manufacturing Co., of Scranton, Pa., is now working to full capacity in all departments. Many large contracts have been held back, pending the result of the election, which the officers expect will be closed soon. This would necessitate working overtime.

The machinery of the American Steel Barge Co., Superior, Wis., has been put in motion with several hundred men at work, and it is promised that the plant will continue in operation all winter and all next summer with 1,000 men employed.

Those interested in the reorganization of the West Superior Iron & Steel Co. say that all obstacles in the way of reorganization have been removed, and they expect to see the plant in operation this winter with 800 hands employed.

A contract for 25 air compressors and 25 air receivers, of medium and small sizes, has been closed by the Clayton Air Compressor Works, Havemeyer Building, New York, with one company, delivery of the entire order to be made within six months from date. Sales of five air compressors of standard pattern during the first week in November are also reported and the indications point to a decided revival of trade in air compressors, many orders having been held in abeyance pending the result of the election.

The Peerless Rubber Co., in North Bergen, N. J., has put on 150 men who were suspended during the dull times before the election, making a total of 500 men now employed in the factory.

The Ironton Structural Steel Co., of West Duluth, Minn., started its new rolling mill Nov. 12. This company has large orders for plates and the mill will be operated to its full capacity. Mr. S. F. Haupt is General Manager of the company.

The New York, New Haven & Hartford has awarded a contract for constructing a 72-lever interlocking switch and signal plant at its yard in Stamford, Conn., to the Standard Railroad Signal Co., of Rahway, N. J.

The Youngstown Bridge Co. recently closed contracts for seven bridges on the Erie road, and for four buildings for a smelter plant in Arizona; two spans of bridge with paved floor at Woonsocket, R. I., and the Fort avenue bridge for the B. & O. R. R. consisting of four double track spans 105 ft. each, together with other work for the same company.

The Lehigh Valley, according to a newspaper report proposes to remove its car shops and paint shops now at Easton, to Packerton, Pa., to permit of an enlargement of the locomotive department at Easton.

Articles of incorporation of the Chase-White Furnace Co., have been filed at Superior, Wis. The company will manufacture hollow, blast rocking grates, boilers, engines, etc. The capital stock is $50,000. The incorporators are Henry L. Chase, James L. White and W. C. Ribenack.

The Schoen Pressed Steel Co. has put 500 additional men at work in its shops since the election, and the company expects to be running full time in all its departments within a month and give employment to 500 additional men.

The Dickson Manufacturing Co., at Scranton, Pa., is now working to its full capacity in all departments and is working overtime in some to fill orders.

The Cleveland Twist Drill Co., the Atlas Bolt & Screw Co., the King Bridge Co., the Cleveland Machine Screw Co. and the Britton Rilling Mill Co. are among the many industrial establishments located at Cleveland, O., which have either started up or increased their forces since the election.

The Phœnix Bridge Co. is working on several large orders which, it is stated, were contingent upon the election of McKinley.

The Boies Car Wheel Works, at Scranton, Pa., have begun working full time in all departments.

The Schenectady Locomotive Works have received several good-sized orders for engines and boilers, and it is expected that the entire working force will again be employed shortly. Among the railroads now reported ordering locomotives are the Northern Pacific, Portland & Mumford Falls, Delaware & Ulster, Michigan Southern and Michigan Central.

Preparations for starting the Westinghouse Air-Brake Works in full are well under way, and, according to newspaper statements, 5,000 men will be soon working full time.

The Pittsburgh Locomotive Works have increased the working hours.

The Michigan shop of the Michigan-Peninsular Car Co. was started last week with 400 men at work on repairs. The Peninsular shops started up some time before election and now have 1,800 men at work and are turning out 40 cars a day.

The General Electric Co. is arranging to extend its plant at Schenectady, N. Y., and to increase its force of about 5,000 men. The company has let a contract to John McEneroe for a brick building 296 ft. × 100 ft. Specifications are being drawn, it is stated, for still another building for the company's works, 196 ft. × 100 ft.

The Wabash has specified the Falls Hollow staybolts made by the Falls Hollow Staybolt Co., of Cuyahoga Falls, O., for the 20 engines for which specifications have just been prepared.

A contract for 26,000 tons of water pipe for the extension of the water system of Baltimore, Md., to the Annex, has been awarded to the National Foundry & Pipe Works, Scottdale, Pa., on its bid of $19.40 per ton of 2,240 lbs.

The Boston Belting Co. has introduced a red signal hose, the distinctive features of which are its natural red color and a peculiar rough surface which enable the trainmen to distinguish the signal hose from the air-brake hose either night or day. Some railroads now have the signal hose painted red to enable trainmen to distinguish it from the air-brake hose, but the paint deteriorates the rubber.

The Peninsular Works of the Michican Peninsular Car Co., which were opened about six weeks ago with a force of 1,500 men, were unexpectedly closed on Tuesday of this week. The shut-down is stated to be for an indefinite period.

The Westinghouse Air-Brake Co. has bought the buildings of the McKehnie Machine Co., in Hamilton, Ontario, Canada, and is refitting and equipping them to be used for the manufacture of the Westinghouse air-brake. A Canadian company has been formed, and application has been made for a charter. The object of locating a plant in Canada is to avoid the high duty, which is about 33 per cent. The large orders which the Westinghouse Co. is now filling for Canadian roads, and others which are expected in the near future, warrant the operation of a plant in Canada. Mr. George F Evans, of New York, will be the General Manager of the new works.

Iron and Steel.

A meeting of the Bessemer Steel Association, which was formed last spring to control output and maintain prices, was held in New York City, Nov. 10 to 13 inclusive. The specifications of the association were changed to include all articles manufactured from billets. An ingot basis was not adopted, the finished material project being thought a better method. Secretary Griscom, of the association, states that the price of billets will not be changed.

The strike of the employees of the Tudor Iron Works, at East St. Louis, which has been in progress for two years, was declared off on Nov. 15, the proprietors having acceded to the demand for increased wages. This will give employment to 800 men.

The Homestead Works of the Carnegie Steel Co. are now working full in all departments, 3,500 men being employed.

Rebecca Furnace, of the Kittanning Iron & Steel Mfg. Co., Kittanning, Pa., is being extensively overhauled. The furnace has been idle since July, and will probably be blown in before the first of next year.

The Burden Iron Co., Troy, N. Y., has put in operation 24 additional puddling furnaces. This gives employment to 200 men.

It is stated that the Colorado Fuel & Iron Co., of Pueblo, Col., has orders from the Atchison, Topeka & Santa Fe Railroad for 10,000 tons of rails, 1,200 tons of fish plates and 1,500 kegs of spikes.

The Eagle Furnace property at Spring Valley, Wis., will be sold at public auction on Dec. 10, at Ellsworth, Pierce County. The furnace is 65 × 13 ft., built for charcoal. The property comprises 74 acres of ground, with all buildings. D. B. Dewey, 111 Monroe street, Chicago, is the Receiver.

Mary Furnace, of the Ohio Iron & Steel Co., at Lowellville, has been blown in. The furnace was shut down for five months, during which time considerable improvements were made.

The Carnegie Steel Co., of Pittsburgh, Pa., will resume the work on its two new blast furnaces, Nos. 3 and 4, which was stopped last June. It is said that a number of 50-ton open-hearth furnaces will also be erected.

The Glasgow Iron Co., near Pottstown, Pa., started its puddle mill on Nov. 9, after several weeks of inactivity.

New Stations and Shops.

The Baltimore & Ohio is preparing to extend its compressed-air plant at the Mt. Clare shops. A new locomotive repair shop is being built, and compressed air will be very extensively used. Two 50-ton cranes have been purchased for this shop, and the power will be electricity furnished by the power station that also furnishes the electricity for the motors and Baltimore City tunnel.

The improvements that are being made at Locust Point, the Baltimore freight terminal of the Baltimore & Ohio, give the yards an additional capacity of 1,200 cars, making a total of 3,600 that can be handled at that point. A new slip has been dredged which will increase the capacity for foreign business at least 25 per cent.

A contract has been closed between the Des Moines Union Railroad and the Chicago, Great Western & Wabash, Chicago & Northwestern, Des Moines & Northern and Chicago, Milwaukee & St. Paul roads, by which the local company is to build a Union station on Cherry street, between Fifth and Seventh streets, next spring. The building will cost $200,000. The Des Moines Union will also build extensive shops, and the Chicago Great Western will build a big freight-house to cost $50,000.

The Central of New Jersey has given the contract for building a handsome stone and frame station at Freehold, N. J., to Messrs. A. Brower & Son, of that town. The structure will cost $7,000. Mr. Wm. Conover, of Freehold, is the architect.

The Northern Pacific has decided to build a large roundhouse at the East End, Superior, Wis. It will be a brick and stone structure and will contain about 16 stalls. Work will be commenced not later than Dec. 1, and will be pushed to a rapid completion.

Interlocking.

The National Switch and Signal Company has just completed for the Wisconsin Central a ten-lever plant, with electric locking and derails, at the crossing of the Chicago, Milwaukee & St. Paul at Hilbert Junction.

The Dodge-Philion Pulley Patent Valid.

Judge Sage, of the United States Circuit Court, Southern District of Ohio, recently handed down a decision sustaining the Dodge & Philion pulley patent in the suit for infringement instituted by the Dodge Manufacturing Co., of Milshawka, Ind. Only the first and third claims are alleged to be infringed. These are:

1. A separable pulley whereof, when the meeting ends of the rim are in contact, the meeting faces of the spoke-bar and hub are slightly separated, as described, combined with clamp bolts *G*, whereby said hub is clamped upon the shaft in the manner set forth.
3. A separable pulley whereof, when the meeting ends of the rim are in contact, the meeting faces of the spoke-bar are slightly separated, and clamp bolts *G*, combined with a separate split thimble interposed between said shaft and pulley, substantially as set forth.

The specification states that pulleys are to be made of wood. This statement must be considered as running through the entire specification and claims. Complainants have never used any material for the thimbles except wood, and the invention of their patent relates to wooden thimbles. Hence, in order to anticipate the third claim, there must be shown an anticipating device having its rim segments in contact, a divided spoke united at the ends but separated between the rim of the pulley by an open space, and a hub provided with a split bushing of wood or its equivalent, and adapted to be clamped to its shaft by compression. The defendants have set up and introduced evidence tending to prove twenty-nine instances of prior use, and the defense is, want of patentable novelty in claims one and three, and that they are wholly void in view of the prior state of the art. The defendants' expert testified that wooden pulleys have been quite common. There have been split pulleys, and it is testified that the idea of pulley halves in contact only at the rim and open elsewhere so that the clamp bolts may draw the hub tightly to the shaft, is old, but examination of the patents and publications relied upon to support this contention shows that none of them contain the combination or produce the results of the invention discovered by the complainants' patent. In short, the complainants' patented pulley is the only one shown in the record in which compression to the shaft to any required degree—a compression bringing the entire inner surface of the hub to bear upon the shaft, and so constructed that it may be increased whenever necessary by reason of change of shaft or of wear or of any other cause, is so effected as to be superior to any other mode of fastening or attachment, and to impart to the pulley its greatest mechanical power, and yet leave entirely separable into its own halves and from the shaft. In consequence of these findings, together with many others stated in the decision, the Court holds that the evidence is clear that the defendants are infringers, and states that the decree will be against them with costs.

Trial of Battleship Iowa.

A trial of the new battleship Iowa was made last week by her builders, the Cramp's Shipbuilding Co., Philadelphia. The Iowa left Philadelphia on Tuesday, Nov. 10, returning on the following Friday evening, and the result of the trip was in every way satisactory to Edwin S. Cramp, who was in charge. The trial was made over the usual builder's course, instead of over the government course, at Cape Ann. On Nov. 13 a trial of speed was made, and under a forced draft the Iowa was driven for 20 miles off shore and then headed landward again; on this run an average of 16.27 knots, at 112 revolutions, was made, the ship occasionally spurting up to 17 knots. The contract requires a speed of 16 knots on the trial trip, and provides a premium of $50,000 for each additional quarter-knot.

Increase in Pig-Iron Production.

There was a slight increase in the pig-iron production of this country during the latter part of October. The production reached a minimum in September, there being at the end of that month only 130 furnaces in blast throughout the whole country, with a weekly capacity of only 112,728 tons; this was a considerable decline from Aug. 31, when 145 furnaces were in blast with a total weekly capacity of 129,500 tons. On Nov. 1, there were 133 furnaces in blast, producing 124,077 tons weekly. The indications are that during the present month the increase of production will be much more marked, owing to the large number of plants which are beginning to show an increased activity, many additional furnaces having already been blown in. The table which follows shows the general location and condition of all the furnaces in the United States on Nov. 1.

Location of furnaces.	Total No. of stacks.	No. in blast.	Capacity per week —tons.	No. out of blast.	Capacity per week —tons.
Pennsylvania..	171	57	64,022	112	69,981
Ohio.....	54	16	11,708	38	25,551
The South.....	125	36	28,619	89	40,911
Other districts	120	24	19,828	98	64,001
Total.....	470	133	124,177	337	200,444

A New Steamship for the Old Dominion Line.

A contract for building a new steamship for the Old Dominion line has been given to the Roach Shipbuild-Co., Chester, Pa. The new ship will be about 315 ft. in length and 45 ft. beam. She will be much like the Jamestown and Yorktown in construction and appearance, and but a trifle larger. The work will be pushed rapidly, as the vessel is to be completed by Aug. 1, 1897.

New Guns Tested at Fort Wadsworth.

Four of the five new 8-in. guns with disappearing carriages at Fort Wadsworth, New York, were tested on Nov. 16. These guns have been in place for some time, while preparations were being made for the tests. The concrete foundation of the middle one of the five had shrunk somewhat after the gun was put in place, so that gun was not ready to test. The target was placed 6,035 yds. down the bay; it was 10 ft. high, with a black bull's-eye in the center, 4 ft in diameter. The projectiles were of solid steel, weighing 300 lbs. Several shots were fired by each of the four guns, and the results were considered to be very satisfactory, one of the shots having struck the target, and all of the others being very close to it.

The History of Stone Bridges.

The October issue of the *Journal of the Association of Engineering Societies* contains a part of a lecture delivered by Prof. George F. Swain before the Boston Society of Civil Engineers on "The Historical Development of Stone Bridges." The lecture was presumably illustrated by lantern slides; at any rate, as printed, it contains 26 illustrations, most of them from photographs, and all of them of celebrated structures. The text is a brief running description, giving dates, dimensions and other information of the illustrations. Of course, the Pont du Gard appears almost at the beginning of the lecture, and the Cabin John Bridge, the longest stone arch in existence, and the Echo Bridge, 127 ft. span, in the Sudbury Aqueduct, properly close it. We call attention to this lecture as being a monograph which almost any engineer would like to have in his library, the information which is collected in it being difficult to find, and perhaps never having been brought together before in one handy document.

THE SCRAP HEAP.

Notes.

In the United States District Court at Salt Lake, Utah, 13 coal dealers have been found guilty of combining to prevent persons not members of their exchange from obtaining coal at prices as low as those enjoyed by themselves.

At Winnsboro, S. C., last Saturday night, three passenger trains, including one mail train, were delayed several hours by an attachment for an old debt of $119 placed upon the locomotive by a sheriff. He chained the wheels to the track.

The City Council of Carrollton, Ill., has passed an ordinance requiring railroad companies to place and maintain a flagman at each street crossing; but if the rail roads will pay the expense of an electric arc light at each crossing the provisions of the ordinance will not be enforced.

The Lehigh Valley road now runs its through Niagara Falls trains by way of Buffalo, the company's line between Buffalo and Niagara Falls having been opened for passenger traffic on Nov. 15. Heretofore the trains were divided at Batavia, the cars for Niagara Falls being sent from that point over the track of the New York Central. The trains will run back from the Buffalo station to the junction with the new Depew & Tonawanda branch of the Lehigh Valley, over that line to North Tonawanda and thence into Suspension Bridge over the New York Central tracks.

With the Winter time-table the Pennsylvania puts on a new fast mail train from New York to Chicago, starting at 8 a. m, and running through in 25 hours. This train will take passengers for Pittsburgh and beyond, but not for any point east of Pittsburgh. The time through is about the same as that of the fast mail of the New York Central, which leaves New York at 9.30 a. m.

The Pullman and the Wagner Sleeping Car Companies are making unusual efforts to enforce the rule both companies have had nominally in effect many years, requiring passengers on sleeping cars to carry no baggage on the cars which they cannot take into their berths. The accumulation of heavy baggage in sleepers has become as great a nuisance to passengers as to the sleeping car companies.

Mr. John Sebastian, General Passenger Agent of the Chicago, Rock Island & Pacific, has got up a coupon ticket designed to facilitate prompt reporting by the selling road to all of the lines interested. The ticket is practically double, being divided by a vertical perforated line, the part to be torn off, called the "agent's advice check," being practically a series of stubs, not only for the contract, but also one for each coupon. There is also a "conductor's advice check" to be detached by the first conductor to whom the ticket is presented.

The Supreme Court of the United States has handed down its decision in the case of the Central Pacific against the United States, involving the question of the right of the company to compensation for carrying post-office inspectors. The Court held that the company had waived any right of compensation that might exist. The government's right to secure free transportation on bond-aided roads was not directly covered, as the decision turned on the point that the railroad had freely given free transportation, not putting in a claim until long afterward.

Lake Notes.

Two wood ships will be started at Bay City by Captain Davidson very soon.

Contracts have been let in Chicago for two steamers for lake service to be ready early in the spring. They are probably to be used in Lake Ontario & Chicago traffic.

Iron-ore shipments on the Great Lakes will close in about a week with a total for the year of about 9,500,000 gross tons, less than 1,000,009 tons below the movement of 1895. Vessel and ore men are even now talking of the business of 1897, and predict all the way from 12,500,000 to 15,000,000 tons. This will keep occupied the entire lake fleet.

The American Steel Barge Co. has taken out of the water the two barges built in 1893 at Brooklyn, and which have since been in coast service. They will be lengthened 60 ft. and used hereafter on the lakes. A third of the company's barges will be lengthened and it is possible that the largest lake steam freighter ever built will be built at its yard during the winter.

South American Notes.

Messrs. Charles Bright & Co. have petitioned the Argentine Congress for a concession for a system of underground railroads in Buenos Ayres. The petitioners ask for no guarantee.

The work of constructing the Neuquen extension of the Buenos Ayres Great Southern Railroad has been commenced. This line will open up valuable territory at the base of the Andes in Southwestern Argentine.

The Buenos Ayres Pacific Railroad has obtained its concession for a branch line from Rufino to Italo and Buena Esperanza, 248 miles in length, intended to open up a new sheep-growing district. Construction will begin early in 1897.

The Buenos Ayres Western Railway Co. has signed an *ad referendum* contract with the Argentine Government for the construction of a branch line from General Villegas to San Rafael in the province of Mendoza, 397 miles in length, estimated to cost $6,000,000.

These signs of activity in Argentine railroad circles betoken prosperous conditions both in the country at large and among the transportation companies. An examination of the earnings of the independent roads (as distinguished from those having a government subsidy) bears out this assumption. The four greatest independent lines are the Buenos Ayres Great Southern, the Buenos Ayres Western, the Buenos Ayres & Rosario, and the Central Argentine, aggregating 3,533 miles of track. For the first half of 1896 these roads report an increase in gross earnings, over the corresponding period of 1895, of $1,223,415, and an increase in net earnings of $564,305. The working expenses on these four lines were as follows: On the Great Southern, 32.26 per cent.; on the Western, 32.19 per cent.; on the Rosario, 52.82 per cent., and on the Central Argentine, 54.31 per cent. The train miles run per mile of line were respectively 833, 1,663, 962, and 1,282. The dividends declared on common stock for the half year were respectively 3 per cent., 3 per cent., 1 per cent., and 1½ per cent.

New York State Canal Contracts.

Contracts were awarded on Nov. 10 by Superintendent of Public Works George W. Aldridge, for work to be done in improving the Middle Division of the Erie Canal, and the dams on the Oswego Canal, as follows: For improving the Erie Canal from the east line of Oneida County to Lock No. 46, to T. J. Dwyer & Co., of Utica, N. Y., for $125,520; from Lock No. 49 to Lock No. 50 to McDonald & Sayre, of New York City, for $148,948; from Lock No. 50 to Camillus Road Bridge, to John Dunfee & Co., of Syracuse, N. Y., for $136,842; from Camillus Road Bridge to Peru Road Bridge, to John Dunfee & Co., of Syracuse, N. Y., $154,471; from Peru Road Bridge to Lock No. 51 to John Dunfee & Co., of Syracuse, N. Y., for $150,614. On the Oswego Canal, for building a portion of a stone apron at Phœnix Dam, to Dodge & MacGregor, of Buffalo, N. Y., $12,206; for raising Braddock's Dam, to John Kelly & Co., of Syracuse, N. Y., $10,690; for raising Minetto Dam, to John Kelly & Co., of Syracuse, N. Y., $13,425; for raising High Dam, to John Kelly & Co., of Syracuse, N. Y., $17,801; for raising Oswego Dam, to Hughes Bros. & Bangs, of Syracuse, N. Y., $51,370; for improving Lake Ontario level, to Randerson & Seward, of Albany, N. Y., $30,345; for improving lock No. 46 at Utica, to T. J. Dwyer & Co., of Utica, N. Y., $16,195. On the Erie Canal, for improving lock No. 49, to Hughes Bros. & Bangs, of Syracuse, N. Y., for $15,352; for improving lock No. 50, to John Kelly & Co., of Syracuse, N. Y., $15,357. For rebuilding and lengthening lock No. 18, Oswego Canal, to Walter Bradley, of Fulton, N. Y., $62,191.

Only two contracts yet remain to be let for work which will be begun this year on the canals under the

$9,000,000 improvement appropriation; those are for improving the Erie Canal, Eastern Division, between locks Nos. 18 and 19; and for improving the Oswego Canal, from guard L to lock No. 11. It is expected that the contractors will begin work as soon as the canals are closed to navigation, probably about Dec. 1, and it is hoped that the work will be completed by the opening of navigation in the spring.

Floods in the Northwest.

During the early part of this week a storm, said to be the most severe in years in that part of the country, swept over Western Washington and British Columbia, extending down into Northwestern Oregon. Railroads and private property suffered alike. On the Northern Pacific travel was stopped by a landslide near Easton, on the eastern slope of the Cascades. A few miles beyond Easton the Yakima River bridge was washed away. The Portland branch of the same road was disabled by a landslide in Cowlitz Valley, 50 miles south of Tacoma. From Snohomish to Skyhomish, a distance of 52 miles, the Great Northern has been badly washed and has had many of its bridges swept away. At Index the railroad bridge has been carried from its piers down the Skyhomish River. At Everett the Seattle & International's bridge, over the Snohomish River, has been rendered unsafe by a jam of driftwood. The railroad track near Lowell has been washed out and water covered the tracks in the Everett & Monte Cristo tunnel several feet deep for its entire length. In British Columbia the Canadian Pacific has suffered serious damage for a distance of 100 miles east of Vancouver, many bridges being washed out. No trains arrived at Portland either by the Northern or Southern Pacific on Monday, due to the flood in the Willamette River.

The Southern California Deep-Water Harbor.

The commission appointed to report upon the most suitable location for a deep-water harbor for the port of Los Angeles met for formal organization at Washington on Nov. 16, and adjourned to meet at Los Angeles Dec. 2. The struggle between Santa Monica and San Pedro to be chosen by the government as the deep water harbor of Southern California, has been so active and prolonged that Congress, in the last River and Harbor Bill, provided for the appointment of a commission to investigate the whole subject and report to Congress which harbor should be deepened. The personnel of the commission is conspicuous. Rear-Admiral John B Walker, President of the Lighthouse Board, is detailed by the Secretary of the Navy, and is chairman; the other members are Assistant August F. Rogers, detailed by the Superintendent of the Coast and Geodetic Survey, and William H. Burr, of New York; George Morison, of Chicago, and Richard P. Morgan, of Illinois, appointed by the President.

Bonus for Long Service.

The following notice has been issued by the Montreal Street Railway Co.: "To Conductors and Motormen: The President and Directors of the Montreal Street Railroad, being desirous of marking their appreciation of the faithful and long-continued service of conductors and motormen, have decided to grant this year to those of them having more than five years' service a bonus. This bonus is to be regulated as follows: Men in the service 5 years, $10; 10 years, $20; 15 years, $30, and 20 years and upward, $40. These amounts are payable on the pay-day, about the middle of the month."

Recent M. C. B. Rulings.

At a meeting of the Arbitration Committee, held Nov. 6, 1896, the following subjects were brought to its attention and were considered worthy of a ruling in accordance with the instructions from the association that the Arbitration Committee should make a ruling on questions arising and not settled by the rules, which ruling should stand as a part of the rules for the year:

E. When air-brake hose is missing it is evidence of unfair usage, and the cost of replacement is chargeable to the party having possession of the car.

F. There seems to be some misunderstanding also in regard to Section 49 of Rule 3, Sections 15 and 16 of Rule 4 and Section 5 of Rule 5. The Arbitration Committee rules that a proper understanding is as follows:

It is the intent of the Rules that a repair card should be used in all cases when repairs are made, whether such repairs are made right or wrong, or whether they are to be charged to the car owner or not.

A company making wrong repairs, whether of owner's defects or not, becomes responsible for making the repairs right. When such wrong repairs are made of owner's defects, bill may be rendered against the owner for the wrong repairs the same as if they had been correctly made, but an M. C. B. defect card must be attached for the wrong repairs, which will be used as a basis of a bill against the party making the wrong repairs.

G. Section 11 of Rule 5 reads: "When drawbars, knuckles, hose or brakebeams are replaced under conditions which make them chargeable to the owner, new material must be used." This paragraph was introduced at the convention as an addition to Section 13, although given a new section. The Arbitration Committee believes that by "drawbars" it was intended to mean "M. C. B. drawbars," and its decision is that the letters "M. C. B." should precede the word "drawbars" in this section. As further justification of this ruling, it calls attention to the fact that ordinary link-and-pin drawbars are almost necessarily second-hand material.

The Metropolitan Traction Company.

The directors of the Metropolitan Traction Co., of New York City, which is a financing and investing company organized to construct and control the lines now operated by the Metropolitan Street Railway Co., including the Broadway, Lexington and Columbus avenue cable lines and a number of other street-car lines in New York City, have decided to wind up the affairs of the company, distributing the securities now held in its treasury among its stockholders. These are securities of the Metropolitan Street Railway Co. and the stockholders of the Traction Company secure interest-bearing scrip and dividend-paying stock of the Metropolitan Street Railway Co. The action does not merge the Metropolitan Traction Company with the Metropolitan Street Railway, but is simply issuing the stock of the Street Railway at par in exchange for that for the Traction Company, whose object having been attained will now be closed up. The capital stock of the Street Railway Co. is now about $30,000,000, having been increased about six months ago from $16,500,000. All the Street Railway Company's securities have been held in the treasury of the Traction Company.

The Philadelphia Subway.

Bonds to the amount of $6,000,000 will be issued by the city of Philadelphia for the purpose of constructing the Philadelphia & Reading subway. The securities will bear interest at the rate of 4 per cent. and the Philadelphia & Reading Company will pay half of the interest and also redeem half of the principal. Forty bids were opened this week for $1,500,000 of the bonds, the issue being over-subscribed nearly three times.

LOCOMOTIVE BUILDING.

The Lake Erie & Western will make considerable additions to its equipment after Jan. 1 next.

The Rogers Locomotive Works, of Paterson, N. J., has an order for six new locomotives for the Mobile & Ohio.

The Delaware & Hudson Canal Co. has recently bought six new engines, and will place further orders in a few months.

The Fall Brook Railway will order two passenger locomotives to take the place of four old ones about worn out. These engines will be for April or May delivery.

The Wabash is to build 20 locomotives instead of 30, as reported last week. The engines will include 15 ten-wheel freight and five 10-wheel passenger, and the specifications have now been issued.

The Brooks Locomotive Works has recently shipped to Japan two double-end side-tank locomotives. Three 10 wheel passenger engines for the Burlington, Cedar Rapids & Northern, each with cylinders 18 in. × 26 in., have just been shipped from the same works.

CAR BUILDING.

The Illinois Central is asking bids on 1,000 freight cars.

The Gulf, Beaumont & Kansas City is in the market for 40 box cars for prompt delivery.

The Chicago, Hammond & Western is in the market for 100 box cars and a number of refrigerator cars.

The Wisconsin Central is reported to have let 1,000 cars to the Haskell & Barker Car Manufacturing Co., of Michigan City, Ind.

The Haskell & Barker Car Manufacturing Co. is reported to have an order for 1,000 cars from the Chicago & North Western.

The Barney & Smith Car Co., of Dayton, O., is completing 10 combination baggage and passenger cars for the Baltimore & Ohio.

The Delaware & Hudson road is to order a number of new cars next spring. The number is not yet decided and orders will not be given out before March.

The Richmond, Fredericksburg & Potomac is likely to add to its rolling stock, but the matter has not been definitely decided upon and no orders will be placed at present.

BRIDGE BUILDING.

Ashland, Ky.—The plans submitted by the Chesapeake & Ohio engineers for the proposed railroad bridge over the Ohio River at this point, having been adversely reported upon by the United States engineers, new plans with a larger channel span will be prepared at once.

Braddock, Pa.—It is stated that engineers have completed the survey for the new bridge to be built over the Monongahela River at West Braddock by the Braddock & Homestead Electric Street Railway Co. It will connect Homestead & Braddock. The work on the piers will start this month, and the bridge will be completed this winter. The structure will cost $200,000.

Brooklyn, N. Y.—Engineer Buck, of the new East River Bridge, has reported that the plans for the Brooklyn foundations are complete, and the specifications are soon to be made public.

Chester, N. Y.—The present high wooden highway bridge over the Erie, it is stated, will shortly be removed and an iron one built in its place.

Chicago, Ill.—Alderman Knudson has introduced an order for a bridge across the Chicago River at North Carpenter street. It has been referred to the Finance Committee.

Cincinnati, O.—Bonds to the amount of $79,500 have been authorized for the purpose of building the Newtown bridge. Frank S. Krug, County Engineer.

Dayton, O.—A new steel bridge to replace the Third street structure has been recommended to the Board of City Affairs by Frank C. Osborn, C. E., of Cleveland, O.

Dushore, Pa.—The Owego Bridge Co. has the contract to build a $1,200 bridge at this point.

Grafton, W. Va.—The Baltimore & Ohio has a force of men at work on the foundations for a new single span steel 70 ft. bridge over Three Fork Creek on the Grafton & Belington Branch, near here.

Green Bay, Wis.—Bids are invited until Nov. 27 for rebuilding the swing span of the bridge over Fox River at Main street. The span will be 182½ ft.; $12,000 has been provided for the work. E. L. Shaw, Marinette, Wis., City Engineer.

Marietta, O.—Press reports state that surveyors have begun work on the location of a railroad and wagon bridge across the Ohio at this point. The Marietta approach is to start at the Union depot, the bridge finding its other terminus on the high plain in Williamstown. The estimated cost of the structure is $3,000,000. It is projected by Mr. William Jutte, of Pittsburg.

McKeesport, Pa.—Select Council has passed an ordinance granting the National Tube Works right to build a foot bridge over Locust street, at Fourth.

Miller's Falls, Mass.—The commission on the abolition of grade crossings has made a report recommending the extension of Bridge street across the railroad, requiring a bridge 100 ft. long with a roadway 20 ft. wide. The work is to be done by the Fitchburg Railroad Company.

Philadelphia, Pa.—Ordinances have been introduced in councils for the building of a new iron bridge over the Pennsylvania at Fifty-second street, at a cost of about $50,000, and also for an iron bridge over the Baltimore & Ohio at Sixty-fifth street.

The engineering department of the city is at work on plans for the changes necessary to elevate the tracks of the Kensington branch of the Pennsylvania Railroad in the northeastern part of the city. This extensive improvement, which has been under consideration for a number of years, will cost about three million dollars, and the reports state that the city is to pay 37½ per cent. of this amount. The line to be raised extends from the Kensington station, near Norris street, to the junction with the main line near Butler street, and Thirty-third street crossings at grade will be abolished. Besides the bridges at the streets, metal structures will be required to support the tracks at some other points, although for the most of the distance the new road will be built upon an earth embankment.

On Nov. 10, Director Thompson opened bids for repairs to South street bridge. Only $25,000 is available for the work and some of the bids exceeded that amount. Five bids were received ranging from $24,800 to $27,900. The work includes reinforcement of all trusses, and cross-floor beams on the draw, reinforcements of laterals and bottom chords, placing new check plates on the chords of the fixed spans, providing truss spans and draw spans, furnishing and placing an electric motor and controller for the draw, and also making all necessary alteration and attachments to the draw machinery.

Scranton, Pa.—An ordinance has been introduced in the Common Council providing for issuing city bonds amounting to $150,000 to be applied to purchasing land, paying damages, and building a viaduct over the Delaware, Lackawanna & Western, crossing on West Lackawanna avenue. The ordinance has been referred to the Streets and Bridges Committee.

The Grand Jury has recommended the building of 16 county bridges at a total cost of $8,975. The following are the iron structures: One in Spring Brook Township, over Rattle Snake Creek, $800; two in Benton and North Abington townships, over the Tunkhannock Creek, $300 each; one in the township of Scott, over Taylor's Creek, $750; one in the township of South Abington, over Summit Reservoir Creek, $1,000. The balance are to be stone arches.

Seneca, Md.—A new iron viaduct at this place, on the Washington Branch of the Baltimore & Ohio, is completed. It cost $35,000, and replaces the old wooden structure that has been standing for years.

Wilkes-Barre, Pa.—Thirty-one new bridges, most of them stone arch structures, have been recommended by the Grand Jury. The iron bridges recommended are: in Franklin township over Sutton's Creek, $600; in Marcy township over Falling Brook, $1,200; in Nescopeck over Nescopeck Creek, $1,800.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In South Carolina it is held that where a railroad owns and operates two connecting lines, under individua names, but under one management, and having but one agent in a city into which both run, where, for convenience of the public, more than one depot is maintained, the company is liable for one occupation tax only, under the city's ordinance requiring every corporation to pay a special license tax for carrying on business.[1]

In Pennsylvania the Voluntary Relief Department of a railroad company was an organization formed to establish and manage a fund, made up of contributions by the members of the department and by the company, together with interest, gifts, etc., for the purpose of affording relief to disabled employees, members of the department. Membership was confined to employees, was purely voluntary, and could be terminated at any time. By the terms of his application, an employee agreed that, if he should bring suit against the company for injuries suffered by him, payment of benefits from the relief fund should not be made till the suit was discontinued, or, if prosecuted, any payment on judgment or compromise should preclude any claim on the relief fund. The Supreme Court rules that the contract so made by an employee was valid.[2]

The Federal Courts hold that the Ohio statute making a lessor railroad company liable for the acts, injuries and wrongs inflicted by the officers, agents or employees of the lessee does not operate to give a right of action against a lessor for negligent acts of the employees of a receiver who is operating the road as receiver of the lessee company.[3]

The Supreme Court of Illinois rules that where a railroad was authorized to lay its tracks through territory which was not then a municipality, but subsequently became so, and said municipality, after laying out streets over the tracks was annexed to a city, the right of said company to construct additional tracks over said streets became subject to the power of the city to require it to obtain permission to do so.[4]

In New York it is laid down that the duty of a railroad which has built its road across a highway to restore the highway to its former state, or to such a state as not to unnecessarily impair its usefulness, being a continuous duty, is unaffected by the statute of limitations.[5]

In New Jersey it is held that bonds of a railroad, issued in excess of the amount of stock actually paid in, are invalid in the hands of one who was a director at the time of such issue.[6]

Injuries to Passengers, Employees and Strangers.

In Pennsylvania a passenger on a street railroad when requested by the conductor to go from the platform to the inside of the car, where there were vacant seats, refused to do so, though he knew that a rule of the company forbade passengers to stand on the platform when there was room in the car. As a reason for refusing he said he was not going far enough to justify him in going inside, but how far he was going he refused to say. The car was then stopped and he was told he must go inside or get off, and, refusing to do either, he was put off by the conductor, who used sufficient force to loosen his hold of the railing and to remove him from the platform and to prevent him from reboarding the car. The superintendent holds that he had no right of action against the company, the rule being a reasonable one.[7]

In Texas the Supreme Court holds that the fact that the conductor of a freight train on defendant's road accepted fare from a person riding thereon does not render the company liable to him as a passenger, in the absence of evidence that the person was ignorant of a rule of the company forbidding passengers to ride on freight trains, or that freight trains were in the habit of carrying passengers on defendant's road.[8]

In North Carolina a passenger who, before he had seated himself in a car, was injured by the negligence of defendant in causing another car to come into violent contact with the former, is not precluded from recovering merely because he did not occupy the first vacant seat he came to, nor because he incumbered himself with bundles or with the care of children, which impeded his movements.[9]

In California it is ruled that where a conductor takes up a passenger's ticket without giving him any check or other evidence of his right to ride, whereby he is expelled by another conductor after exchanging cars, his right of action will not be limited to the breach of the company's contract, though no force was used in his expulsion, but will include all damages sustained through the company's violation of the duties it assumed in entering into such contract.[10]

In Texas a common carrier is liable to a passenger put off at a wrong station for the inconvenience, sickness and expense incurred in going to her proper station, two miles distant, where the evidence shows circumstances forcing her to act as she did, and fails to show that any other course was available to her.[11]

In Ohio the court rules that where a locomotive, which at one time had "run away" after the engineer and fireman had left it standing, and at another time had been taken to the shop for repairs on account of its

leaky throttle valve, suddenly moved while an employee was under it, cleaning the ashpan, after it was properly left standing, without the act of any person to cause it to move, the question whether it moved because of a defect of which the company had notice was for the jury.[12]

The Supreme Court of Kansas rules that a brakeman was not, as a matter of law, guilty of contributory negligence in participating in the making of a flying switch where that was the usual manner in taking out cars from the track where the injury occurred to place in the train.[13]

In Missouri evidence that one killed at a railroad crossing was given to the habit of intoxication is not admissible on the issue of contributory negligence.[14]

In Texas no duty rests upon a railroad company in favor of the public who use its track as a footway to keep its switches blocked in its private switchyards to lessen the chances of injury to pedestrians.[15]

[1] Southern v. Greenville, 23 S. E. Rep., 952.
[2] Shaver v. Penn. Co., 71 Fed. Rep., 931.
[3] Chamberlain v. N. Y., L. E. & W., 71 Fed. Rep., 636.
[4] P., F. W. & C. v. Chicago, 42 N. E. Rep., 781.
[5] Windsor v. D. & H., 36 N. Y. S., 863.
[6] Steelman v. Baker, 33 Atl. Rep., 815.
[7] McMillan v. Federal St. & P. V. Pass. Ry., 33 Atl. Rep., 560.
[8] St. L. S. W. v. White, 34 S. W. Rep., 1042.
[9] Tillett v. N. & W., 24 S. E. Rep., 111.
[10] Slone v. So. Cal., 44 Pac. Rep., 320.
[11] T. & P. v. Hartnett, 34 S. W. Rep., 1057.
[12] L. S. & M. S. v. Raitz, 10 Ohio Cir. Ct. Rep., 70.
[13] St. L. & S. F. v. French, 44 Pac. Rep., 12.
[14] Lane v. M. P., 33 S. W. Rep., 645.
[15] Int. & G. N. v. Lee, 34 S. W. Rep., 160.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Central Massachusetts, semi-annual, ¾ per cent. on the preferred stock, payable Dec. 1.

Butte, Anaconda & Pacific, 6 per cent.

Chicago, Burlington & Quincy, quarterly, 1 per cent., payable Dec. 15.

Delaware & Bound Brook, quarterly, 2 per cent., guaranteed, payable Nov. 20.

Mexican & Northern, quarterly, 1 per cent., payable Dec. 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

St. Paul & Northern Pacific, special, St. Paul, Minn., Nov. 20.

Savannah, Florida & Western, annual, Savannah, Ga., Nov. 24.

Sunbury & Lewistown, special, Betz Building, Philadelphia, Pa., Dec. 1.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736–1739 Monadnock Block, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Engineers' Society of Western New York* meets on the first Monday of each month at the Society's rooms in the Buffalo Library.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building Roanoke, at p. m.

The proportions of the all-rail business carried by the different roads were:

The Engineers' Club of Philadelphia.

A business meeting of the Engineers' Club of Philadelphia will be held on Nov. 21, at which an election of new members will take place. Mr. Charles Piez will present the paper of the evening on "Professional Ethics among Engineers."

Western Society of Engineers.

A regular meeting of the Western Society of Engineers was held in the Society Rooms, Monadnock Block Chicago, at 8 p. m., Wednesday, Nov. 18. A paper was presented by Mr. Edward Barrington, entitled "Street Railway Construction."

Western Railway Club.

The Western Railway Club held a regular meeting in the Auditorium Hotel, Chicago, Tuesday, Nov. 17. The discussion started at the last meeting, on "some difficulties which have arisen under the new M. C. B. interchange rules," was continued. Reports of the committees were read, on the following subjects: "Recent Developments in M. C. B. Couplers" and "Recent Developments in the Tonnage System of Rating Locomotive Performance." A paper was presented by Mr. J. H. McConnell, Superintendent of Motive Power, Union Pacific Railroad, on "Some of the Uses and Advantages of Compressed Air."

St. Louis Railway Club Meeting.

The November meeting of the St. Louis Railway Club was held at the Southern Hotel Nov. 14. There was a large attendance. The discussion was on "Locomotive Supplies," based upon the paper presented at the October meeting by G. S. McKee. Two papers were presented, one by C. W. Eckerson, M. M., Chicago, Burlington & Quincy, Beardstown, Ill., entitled "Increasing Locomotive Mileage by Lengthening of Runs." The second was presented by Prof. J. B. Johnson, of Washington University, entitled "The Mechanical Properties of Wrought Iron and Steel, as Shown by Actual Tests," illustrated by 50 specially prepared stereopticon views.

The Civil Engineers' Club of Cleveland.

At the November meeting of the club, Nov. 10, 52 members and visitors were present. The paper of the evening was by Joseph R. Oldham on "Structural Strength of Ships and Improved Arrangements for Repairing without Diminution of Strength." Mr. Oldham's paper treated of matters under the following heads: Progression by Steps in Engineering; Increase in Steel Lake Tonnage; Bending Moment and Shearing Stress Strength of Beams and Girders; Straining of Ships; Improved Hatches; Useful Weak Ships; Joggling and Lapping; Flush Bottoms; Heavy Ships; Light Ships; A Perfect Mechanical Structure. Messrs. Newman, Searles and Head followed in an interesting discussion.

New York State Association of Railway Surgeons.

The sixth annual meeting of the association was held on Nov. 17, at the Academy of Medicine, 17 West Forty-second street, New York. A number of papers were read and discussed. At a banquet held in the evening at the Hotel St. Cloud, an address was given by the retiring President, Dr. C. S. Parkhill. Officers for the ensuing year were elected as follows: President, Dr. J. F. Valentine, of Brooklyn, Chief Surgeon of the Long Island; First Vice-President, Dr. George Graves, Herkimer, of the surgical staff of the Adirondack & St. Lawrence; Second Vice-President, Dr. F. H. Peck, Utica, of the New York, Ontario & Western; Secretary, Dr. C. B. Herrick, Troy, of the Delaware & Hudson; Treasurer, Dr. T. D. Mills, Middletown, of the New York, Ontario & Western. Chairman of the Executive Committee, Dr. George Chaffee, Brooklyn.

Central Railway Club.

At the November meeting of this club held Nov. 13 at the Iroquois Hotel, Buffalo, the principal discussion was on the need of more general adoption of the Master Car Builders' standards. Mr. Waitt, Chairman of the Committee, submitted a letter urging that the head of the car department personally examine and check in detail all standard patterns and gages used on his road. It is only by this direct supervision that the M. C. B. standards can be maintained in correct form. No haste should be made in adopting new standards. Speaking of the duty of the M. C. B. Association, Mr. Waitt said: "There can be no good reason for not designing, and after a year's trial adopting a standard center plate, standard brake wheel, and brake staff top end, standard dimensions for stake pockets, and many other frequently repaired parts, and, most important of all, standard sectional dimensions of side, center and intermediate sills and end sills for cars of 60,000 lbs. capacity and the same for cars of under 60,000 lbs. capacity."

Mr. Macbeth was of the opinion that sufficient facts should be secured to show the advantages that would be gained by all roads conforming as near as practicable to a standard. He urged the wisdom of dwelling upon these advantages and trying to bring out the reasons why the standards in question are not adopted.

The report of the committee on "Apprentice Boys in Railroad Shops" was deferred until the next meeting.

Among other subjects to be reported upon at the next meeting is: "Brick Arches in Locomotive Fire Boxes." Committee, F. B. Griffith, George Hazleton, E. P. Mooney, A. E. Mitchell, George W. West.

Society of Naval Architects and Marine Engineers.

The fourth general meeting of the Society of Naval Architects and Marine Engineers was held Nov. 12 and 13, in the auditorium of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City. About 60 members were present. Both morning and afternoon sessions were held on each day of the meeting. At the first session, which began at 11 a. m. Nov. 12, the President, Clement A. Griscom, delivered an address, after which officers for the ensuing year were elected as follows: President, C. A. Griscom; Vice Presidents, Charles H. Cramp, Philip Hichborn, Charles H. Loring, Richard W. Meade, William H. Webb, George W. Melville, George W. Quintard, Irving M. Scott, Francis A. Walker and Frank L. Fernald; Secretary and Treasurer, Francis T. Bowles. The old Board of Members and Associate Members of the Council was re-elected with the following exceptions: Mr. W. L. Capps was elected to succeed Mr. Frank L. Fernald, Mr. W. F. Durand to succeed Mr. Calvin B. Orcutt, Mr. J. E. Denton to succeed Mr. Frank W. Wheeler and Mr. Edward Farmer to succeed Mr. J. F. Holloway, deceased. A list of the papers to be read at this meeting was given in the *Railroad Gazette* of Oct. 30. These papers were all presented with the exception of that on the "Trial Performance of the Grand Duchess," by Sommers N. Smith. Abstracts of some of these papers appear elsewhere in this issue.

A banquet, at which about 150 members were present, was held on Friday evening, Nov. 13, at Delmonico's Hon. H. A. Herbert, Secretary of the Navy, being the guest of the society. In responding to the toast, "The Navy of the United States," Secretary Herbert said in part: "The American shipbuilder is entitled to a large share in whatever glory the navy has achieved in the past, and I think I am in a position also to say he is performing his full duty to it now, and that he may be trusted in the future. . . . It is believed that to-day our gunboats, our cruisers, our harbor-defense ships, our battle-ships, and our torpedo boats, just contracted for, our great guns and small guns, our torpedoes, our powder and high explosives, are equal to any in the world. We are now prepared at all points to build ships that are at least equal to any in the world. Preparations are complete for the continuation of, and I hope we shall continue, the programme of increasing our navy." Other toasts were responded to by Commander Miller, of the Naval Reserve; President Hugh Kelly, of the Maritime Exchange; former Chief Engineer C. H. Loring, Chief Constructor Hichborn, Gen. T. W. Hyde, George H. Daniels, William H. Webb, Stevenson Taylor and Joseph Howard.

American Society Mechanical Engineers.

A convention of the American Society of Mechanical Engineers will be held at the house of the Society, New York City, Dec. 1 to 4. Arrangements have been made for the usual rate of one and one-third fare for the round trip on most of the railroads.

The first session will be at 9 p. m. Tuesday evening, when Mr. John Fritz will deliver the annual address as retiring President. This will be on "Progress in the Manufacture of Iron and Steel in America and and the Relations of the Engineer to it."

The house will be open early and members of the society and ladies accompanying them are invited to make free use of the rooms.

On Wednesday morning, at 10 o'clock, a business session will be held. At this meeting the usual reports of standing committees will be presented, but the report of the Committee on Fireproof Materials will be presented Thursday evening, to allow of illustrations by lantern slides. Any remaining time at this session will be occupied by a paper by Sir Henry Bessemer on "The Origin of the Bessemer Process," one by Mr. W. T. Bonner on "Ancient Pompeian Boilers," one by Mr. C. K. Kerr on the "Moment of Resistance," one by Mr. F. H. Boyer on "Work Done by Refrigerating Plant" and one by Professor Thurston on "High-Pressure Steam."

Wednesday afternoon, like the succeeding afternoons, will be left without definite assignment, but an extra session outside the regular programme has been arranged for Wednesday afternoon as a sort of memorial meeting of the late J. F. Holloway, Past President of the Society. Wednesday evening, at nine o'clock, a reception will be held at Sherry's, Thirty-seventh street and Fifth avenue.

Other papers to be presented are as follows:

Thursday Morning.

F. R. Jones and A. L. Goddard: "Experimental Investigation of the Cutting of Bevel Gears with Rotary Cutters."

J. A. Laird: "The Calibration of a Worthington Water Meter."

Francis Schuman: "Contraction and Deflection of Iron Castings."

Jno. W. Seaver: "A 200-ft. Gantry Crane."

J. V. Schaefer: "Washing of Bituminous Coal by the Luhrig Process."

C. H. Benjamin: "Friction H. P. in Factories."

Thursday Evening.

Frederick A. Halsey: "Some Special Forms of Mechanical Computers."

M. P. Wood: "Rustless Coatings for Iron and Steel.

H. M. Lane: "A Method of Shop Accounting to Determine Cost."

The session will conclude with an "Illustrated Presentation of the Report of Progress upon Tests of Fireproofing Material," by Mr. H. de B. Parsons, member of the society's committee on this subject.

Friday Morning.

W. W. Christie: "The Efficiency of the Boiler Grate."
R. S. Hale: "Efficiency of Boiler Heating Surface."
W. F. M. Goss: "Paper Friction Wheels."
Frank H. Ball: "Steam-Engine Governors."
Geo. W. Colles, Jr.: "Metric vs. the Duodecimal System."
Leonard, Waldo: "Aluminum Bronze Seamless Tubing."
Leonard Waldo: "The Photographing of Machinery."

No definite programmes for excursions have been arranged, but cards of admission have been prepared to a great number of industries and places of interest in the neighborhood.

It is expected that the summer meeting will be held in Hartford, Conn.

PERSONAL.

—Mr. Charles E. Pearce, of the Interchangeable Brake Beam Co., of St. Louis, was elected to Congress from St. Louis by a very large Republican majority.

—Mr. J. R. Beetem has resigned his position as General Manager of the Union Traction Co., of Philadelphia. No successor has as yet been appointed.

—Mr. C. Densmore Wyman, formerly General Manager of the Milwaukee Street Railroad Co., was elected General Manager of the New Orleans Traction Co. on Nov. 17.

—Mr. William T. Bartlett, Treasurer of the Union Trust Co., of New Haven, Conn., and at one time Secre-

tary of the New Haven & New London railroad, died at New Haven, Nov. 17.

—Mr. William T. Hart, ex-President of the New York & New England Railroad, died in Boston this week. He was 79 years old, and for many years had been conspicuously identified with New England roads.

—Mr. P. F. Smith, Jr., Assistant Master Mechanic of the Fort Wayne shops of the Pittsburgh, Ft. Wayne & Chicago, has been appointed Master Mechanic of the Crestline shops, succeeding G. P. Sweeley, transferred.

—Mr. C. H. Jenks, Superintendent of the Northern Division of the Great Northern, having been granted a leave of absence on account of ill health, Mr. C. T. Kittredge, chief train dispatcher, has been placed in charge of the operation of that division.

—Mr. F. H. Kindl has been appointed Chief Engineer of the Carnegie Steel Co., Ltd., Pittsburg, Pa., to fill the vacancy caused by the resignation of Mr. A. F. Brown. Mr. Kindl is known as the editor of "Carnegie Hand Book," now indispensable to the mechanical engineer and architect.

—Mr. F. A. Wann has been appointed General Freight Agent of the Chicago & Alton, the position having been made vacant by the resignation of Mr. H. H. Courtright. George S. Tyler, Contracting Agent at St. Louis, has been appointed Assistant General Freight Agent to succeed Mr. Wann.

—Mr. F. W. Hovey, Treasurer of the Sebasticook & Moosehead Railroad in Maine, an office which he held for the last two years, resigned last week. The office will be filled by Mr. Z. D. Lancaster until the annual meeting in July, 1897. Mr. Lancaster is now also Superintendent of the road.

—Mr. W. C. Stith, General Freight Agent of the Missouri Pacific, will assume the duties of the Freight Traffic Manager without change of title, filling the place of Mr. C. A. Parker, who has resigned to become a member of the Board of Administration of the Western Freight Association.

—Mr. C. E. Soule has resigned the position of Superintendent of the Quincy, Omaha & Kansas City road, in Missouri, and the office has been abolished. Mr. C. H. Spencer has been appointed Assistant General Manager, and Mr. C. H. Urmston has been promoted to the office of Assistant General Freight and Passenger Agent.

—The many friends of Mr. D. I. Roberts, General Passenger Agent of the Erie, will be glad to know that he has so far recovered from his recent alarming illness as to have taken up again some of his duties. His escape was a very narrow one indeed, and for days and even weeks the chances were decidedly against his recovery.

—Mr. Robert R. Ritchie has been appointed General Agent for Pacific Coast, for the Freight and Passenger Departments of the Chicago & Northwestern, with headquarters at No. 2 New Montgomery street, San Francisco, Cal. Mr. John A. Kuhn succeeds him as General Agent for the Freight and Passenger Departments, with headquarters at 1,401 Farnam street, Omaha, Neb.

—Mr. R. F. Wilson has been elected Secretary of the Board of Administration of the Western Freight Association. Mr. Wilson was Secretary of the new Western Traffic Association, and since the discontinuance of that association has been employed in the office of Chairman Midgley, acting as Secretary of the various committees of the Western Freight Association. He is an expert stenographer and well qualified for the position.

—Mr. G. P. Sweeley has been appointed Master Mechanic of the shops of the Cleveland & Pittsburgh road at Wellsville, O., to succeed Mr. Thomas F. Butler, who has been transferred to a similar position in the Columbus shops of the Panhandle road. Mr. Butler succeeds Mr. Bernard Fitzpatrick, appointed Master Mechanic at the Pennsylvania Company shops at Fort Wayne to succeed Mr. W. W. Atterbury, who is Mr. J. M. Wallis' successor as Superintendent of Motive Power of the Pennsylvania Railroad Division, Pennsylvania Railroad.

—Mr. E. H. Hinton, of San Francisco, General Agent of the Panama Railroad, has been elected a member of the Board of Administration of the Southwestern Traffic Association, to fill the vacancy caused by the death of Major Waldo. Mr. Hinton represents the Southern Pacific interests, as did Major Waldo. He has long been identified with traffic matters in the Southwest, on the Texas & Pacific and other roads. He went to the Panama road early in 1892, having a few months previously resigned as Assistant General Freight Agent of the Texas & Pacific. Mr. Hinton is in his 44th year, and entered upon his railroad career in 1879 as Joint Freight Accountant of the Chicago, St. Louis & New Orleans and the Mississippi & Tennesse Railroads.

—The Board of Administration of the Western Freight Association is now complete and consists of C. L. Wellington, H. L. Shute, H. H. Courtright, C. A. Parker and J. W. Midgley, the latter acting as chairman. Mr. C. L. Wellington was formerly General Traffic Manager of the Wisconsin Central road. He entered the railroad service in 1873 and served with the Michigan Central and Chicago & Grand Trunk. Prior to going to the Wisconsin Central he was General Freight Agent of the Milwaukee, Lake Shore & Western. Mr. H. L. Shute has a railroad experience covering a period of 40 years. He has served on several important lines and resigned the general traffic managership of the Great Northern road to take his present position. He was formerly General Freight Agent of the "Soo" Lines. Mr. H. H. Gourtright is at present and will be until Dec. 1, the General Freight Agent of the Chicago & Alton road, with which company he has been since 1879. He has been also General Freight Agent of the Hannibal & St. Joseph. Mr. C. A. Parker entered the railroad service in 1881. Since 1891 he has been Freight Traffic Manager of the Missouri Pacific Railway, which position he only recently resigned to serve the new association. Mr. J. W. Midgley, who acts as chairman of the board, has been in railroad work for the past 29 years, starting on the Illinois Central road. At one time he was Private Secretary and Assistant to Marvin Hughitt. Since 1876 he has served the Western roads in various capacities in association work and as Commissioner during a period of 19 years. The members of the board receive a salary of $10,000 per annum each. The board will hold daily sessions in Chicago.

ELECTIONS AND APPOINTMENTS

Baltimore & Ohio.—The annual meeting of the stockholders was held at Baltimore, Md., Nov. 16. The following directors were elected: William F. Frick, James L. McLane, George C. Jenkins, Alexander Shaw, George A. von Lingen, Maurice Gregg, William H. Blackford, of Boston: Louis Fitzgerald, Eugene Delano, Edward R. Bacon, William A. Read, Howland Davis, of New York. Mr. McLane represents the Johns Hopkins interests. He succeeds Aubrey Pearre, who remains as director in several of the subordinate companies.

J. E. Spurrier, Superintendent Baltimore Division, will hereafter have charge of the First Division, including Brunswick Yard, Curtis Bay, Washington, Alexandria, Metropolitan and Frederick branches and Washington County Railroad. Mr. F. A. Husted has been hereby appointed Superintendent of the Second and Third divisions, including the Berkeley Springs and Potomac and South Branch railroads, which will hereafter be known as the Middle Division. Mr. R. M. Shoats, Superintendent Parkersburg and Wheeling Division, will have charge of the Fourth and Fifth divisions, including Grafton Yard and Grafton and Belington Division.

Chicago & Erie.—The directors for the ensuing year are: J. G. McCullough, E. B. Thomas, C. H. Coster, Marcus A. Hanna, Samuel Spencer, J. Lowber Welsh, F. B. Jennings, F. L. Stetson, A. Donaldson, James H. Benedict, John Tod, Simon Perkins and A. M. Rucker.

Chicago & Northwestern.—Robert R. Ritchie, formerly Omaha representative, will be General Agent for the Pacific Coast, with headquarters in San Francisco, and John A. Kuhn will succeed Mr. Ritchie as General Agent, with headquarters at Omaha.

Knoxville & Ohio.—All the old directors have been re-elected except W. H. Baldwin, Jr., who has been succeeded by W. W. Finley.

La Crosse & Southeastern.—The annual meeting of the stockholders was held in La Crosse, Wis., last week, and officers were elected as follows: President, F. A. Roziene, Charles City, Ia.; Vice-President, Alexander McMullen, La Crosse; Secretary, R. Calvert, La Crosse; Treasurer, J. M. Holley, La Crosse.

Manhattan.—At the annual meeting of the stockholders in New York City, Nov. 11, Messrs. Amos L. Hopkins, John T. Terry and Thomas T. Eckert were added to the Board of Directors, the full board being as follows: George J. Gould, Russell Sage, Samuel Sloan, R. M. Gallaway, Edwin Gould, Thomas T. Eckert, Joseph Eastman, Donald Mackay, G. P. Morosini, Howard Gould, Warren B. Smith, John T. Terry and A. L. Hopkins. President, George J. Gould; Secretary and Treasurer, D. W. McWilliams; Vice-President, R. M. Gallaway; Executive Committee, George J. Gould, Russell Sage, Samuel Sloan, R. M. Gallaway and Edwin Gould.

Richmond & Petersburg.—The stockholders of the road, a division of the Atlantic Coast Line system, have re-elected Frederick R. Scott President, H. Walters Vice-President and B. F. Newcomer. Dr. D. W. Lassiter, Henry Walters, Warren G. Elliott and Michael Jenkins Directors.

South Carolina & Georgia.—At the annual meeting of the stockholders held last week, all of the old members of the Board of Directors were re-elected, and Jefferson Hogan was elected a new member of the Board.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Atlanta, Knoxville & Northern.—That portion of the company's line between Blue Ridge and Murphy, N. C., 26 miles, now narrow gage, is to be widened to standard gage. Arrangements to this end are under way and the project will be completed in a short time.

Belington & Roaring Creek.—Contractors Caldwell & Dayton, who were compelled to discontinue work last July, have put a force of 150 men on the last five miles of the line. This road opens up the Roaring Creek coal vein for 20 miles, and half a million acres of timber. Arrangements are making for opening mines at four points along the new road, and several mills are being erected. The road connects with the Baltimore & Ohio and West Virginia Central & Pittsburgh.

Cairo, Hopkinsville & Cumberland Gap.—A preliminary survey has just been completed for a new road to be known under the above name, extending from Cairo, Ill., to Middlesborough, Ky. A short time since a company of gentlemen, said to be from Cincinnati, put up sufficient money to pay the expenses and employed Mr. Hood Tucker to make the survey. The maps and profiles are now being made, and when this is done it is said that German capitalists will then consider the advisability of construction. The engineer reports that good grades have been secured and that the line passes through some of the greatest coal-fields of the country, as well as good timber lands, and that it can be built at a reasonable cost.

Canadian Pacific.—The extension of the Montreal & Ottawa Division, 28 miles beyond the present terminus, is now proceeding rapidly. Various causes have hitherto served to retard the construction of this line, but recently urgent representations have been made to the company by those interested in the sections of country through which it is to run, and there is now every prospect of the line being constructed to its terminus at Ottawa within the next year.

Cincinnati, Jackson & Mackinaw.—It is reported that a survey has been ordered for a line from Hudson, Mich., on this road to a point on the Lima Northern, near Adrian, Mich. It is stated that when the survey has been made work will begin on the new line, and it will be pushed as fast as the weather will permit, to be ready for operation in a few months.

Cowenhoven Railway & Tunnel Co.—This company has been recently organized in Colorado by D. R. C. Brown, a wealthy mine owner; J. M. Downing, D. W. Brunton, George R. Cole and George B. Brown, all of Aspen, Col. The plans of the projectors involve the completion of the Cowenhoven tunnel, through Smuggler Mountain to Lenado, the principal mining town in the Woody District. From there a road is to be built northeasterly to the town of Thomasville, to a junction with the Colorado Midland road in Pitkin County, thence northeasterly again to the town of Minturn, in Eagle County, and to a junction with the Denver & Rio Grande road. In addition a branch line will be built from Thomasville to Ruedi, in Eagle County. The tunnel will be four miles long, and is now completed for about half that distance.

Crystal River.—The road-bed, right of way and five miles of track of the Crystal River road were sold by the Sheriff under judgment execution, at Aspen, Col., on Nov. 10, to Ormar & Crook, the contractors, judgment creditors. The road was begun several years ago to reach a rich section in both Pitkin and Garfield counties, and when completed will have a total length of 28 miles.

Dakota & Pacific.—Articles of incorporation have been filed by this company in South Dakota to build a line from Rapid City to Sioux Falls, S. Dak., crossing the Missouri River at Chamberlain, with a branch from a point in Pratt County to Pierre, and a branch from Chamberlain to Huron.

Depew & Tonawanda.—This branch of the Lehigh Valley, which has been building in the last year from a point on its line at Depew to Tonawanda, was opened for regular traffic last week. The terminus of the line at Tonawanda connects with the existing track of the Lehigh Valley there and the trains run to the North Tonawanda station of the New York Central. The line is about 10 miles long. The contractor was B. P. Smith, of Rochester, N. Y., the line being built under the direction of Mr. C. E. Webster, Chief Engineer of the Lehigh Valley.

Flint & Pere Marquette.—The extension of this road, from Monroe, Mich., to Toledo, O., 18 miles, has been completed, and the first passenger train was run over the line from Monroe to Toledo, on Nov. 16. Four passenger trains will be run over the new line daily.

Gila Valley, Globe & Northern.—President William Garland is now negotiating for the right of way across the Indian Reservation of San Carlos for the proposed road from Geromino, A. T., west to Globe, a distance of about 60 miles. The railroad has secured authority from the United States Government to build across the reservation on the condition that the consent of the Indians be secured. So far President Garland has not been able to get the consent of the majority of the Indians, but there is no strong opposition to granting the right of way, and it is believed that with a little patience the matter will be adjusted. A construction company called the Midland Construction Co., of Bowie, A. T., has been formed to build the road, which, it is stated, will be started as soon as the right of way is obtained.

Goshen & Wabash.—A special election will be held in Goshen, Ind., this week, to vote on the proposition to grant aid equal to one-half of 1 per cent. on the assessed valuation for the construction of the proposed road through Elkhart County to Wabash. The present directors are: F. G. Hubbell, C. W. Miller, Alfred Lowry and J. A. Beane, of Elkhart County.

Greenwood, Anderson & Western.—A section of 10 miles of the extension north of Seivern, S. C., was last week inspected by the South Carolina Railroad Commission and the company has been authorized to open it for general traffic. The grading has now been finished within one mile of Batesburg, and only five miles of track are to be laid to complete the line between those points. This will probably be completed by Dec. 10. Seivern was the northern terminus of the Carolina Midland, which has now been turned over to the new company, and the extension to Batesburg gives it a connection with the Southern.

Gulf, Colorado & Santa Fe.—Mr. L. J. Polk, Acting General Manager of the road, in referring to the improvements now being made on the road, states that 5,000 tons of 60-lb. rails, ordered from the mills some time ago, are now being delivered and are to be used on the line north of Arcola, Tex., replacing the 60-lb. rails now in the track. The main line was recently relaid with new rails between Galveston and Arcola.

Kansas City, Pittsburgh & Gulf.—This company has now in operation 531 miles of road, as follows: Kansas City to Mena, Ark., 380 miles; Horatio to Shreveport, La., 124 miles; Beaumont, Tex., to Port Arthur, 20 miles; Wilton to White Cliff, Ark., 7 miles. To complete the line from Kansas City through to the Gulf of Mexico there remains a gap between Mena and Horatio of about 60 miles, of which 25 is completed, but not yet put in operation. There is also a gap between Shreveport and Beaumont, 125 miles, of which 85 is completed, but not yet operated. It is expected that the entire line will be in operation early in the coming year. The road will be 780 miles long from Kansas City to the Gulf coast at Port Arthur, near Sabine Pass. It is expected to have the road completed prior to Jan. 1, 1897.

La Follette.—Harvey M. La Follette, of the La Follette Land Co., which is building this road in Eastern Tennessee, states that the work on the road is being pushed, the force at work having been doubled since the election. It is the plan of the company to increase its force again. The road is being rapidly pushed into Campbell County, where the coal and timber lands of the company are located.

Manitoba & Lake Dauphin.—The road is reported graded for a distance of 100 miles beyond Gladstone, Man., and work has been suspended there for the winter. Rails will be laid to the end of the grade this fall.

Mobile, Jackson & Kansas City.—The papers of Mobile, Ala., publish a dispatch sent by President F. B. Merrill from New York that definite arrangements for funds for building the line have been financially secured and that bids for the construction of the first division will be advertised for promptly, so that the line could be put under construction immediately. The project is not a new one, and several years ago something over 20 miles of road northwest of Mobile was graded before work was suspended. The line is proposed to extend to Jackson, Miss., the distance being about 180 miles. The present company is understood to have secured the support of financial interests in London and New York.

Montana.—The completion of the road to its proposed terminus in the Castle mining district southwest of Helena, Mont., has been delayed recently on account of the building of the 600-ft. bridge west of Leadboro. The road has been built from Castle Junction on the Missouri River, near Helena, through Sixteen Mile Canon. It crosses a low divide between Sixteen Mile Creek and Smith River, and further on crosses another divide to reach the mine. The district is now very busy and there seems every prospect that the road will have a heavy traffic as soon as it is opened. It will be about 40 miles long, and has been built by a company of which R. A. Harlow is President and A. G. Lombard Chief Engineer.

New Roads.—James Allen and William Shields, of New York City, civil engineers, with assistants, are making surveys for a railroad which it is proposed by Arnold Marcus and associates in New York, to build from a connection with the Fairmont, Morgantown & Pittsburg road, in Marion County, W. Va., to a tract of land known as "The Cannel Coal Field," on Prickett's Creek, and Grassy Run. Mr. Marcus and others made an inspection of these lands a few months ago, and immediately after their departure, agents, supposed to represent them, leased the coal privileges under nearly all the lands lying in the Prickett's Creek and Grassy Run valleys. It will require only about 20 miles of railroad to open all this territory, which is underlaid with seven-foot gas coal and considerable beds of iron ore.

New York & Pennsylvania.—This road was last week opened for traffic between Oswayo, Pa., and Can-

isteo, N. Y., where it connects with the Erie. It is 42 miles long. Shortly trains will run over the Erie tracks to Hornellsville, N. Y. The road has been built in the last two years, and extends from Canisteo to Greenwood; then through fertile farming districts of Steuben and Allegheny counties through the villages of Rexville and Whiteville, crossing the Buffalo & Susquehanna at Genesee, Pa., and going thence through the lumber district of Northern Pennsylvania to Oswayo, its southern terminus. It passes through a rich section of the country not reached by any other line, and bids fair to become a well-paying line. The officers of the corporation are: President, William Cobb, Spring Mills, N. Y.; Vice-President, Maj. Benton McConnell, Hornellsville; Treasurer, William Richardson, Hornellsville; Secretary, I. W. Near, Hornellsville.

Ontario & Pacific.—The projectors have asked the town of Cornwall, Ont., to grant $50,000 in aid to the project, and the question will probably be submitted to a municipal vote in January. The line is projected to extend to the St. Lawrence River, which will be bridged, and a connection made at Cornwall, N. Y., with a proposed American line.

Queen Anne's.—President William H. Bosley states that the eastern division of the line extending from Queenstown, Md., to Greenwood, Del., a distance of 35 miles, had been completed with the exception of about four miles, and that the road will be ready for operation within three or four weeks.

Sunnyside & Western.—At the recent stockholders' meeting a resolution was passed authorizing the issue of gold-bearing five-per-cent. bonds to the extent of $10,000 a mile for the construction of the road from Sunny Side, on the Mississippi River, to Hamburg, Ark., the western terminus. At this meeting the following officers were chosen: President, George S. Edgell, New York; Treasurer, Austin Corbin, Jr., New York; Secretary, W. F. Watkins, Sunny Side. The project is one in which the late Austin Corbin was chiefly interested.

Toronto, Hamilton & Buffalo.—The connecting line of about 1¾ miles constructed at Hamilton, Ont., to connect the present Grand Trunk Toronto line with this road is nearly completed. This is in accordance with the agreement entered into between the Grand Trunk and Canadian Pacific, whereby the trains of the latter company will use the Grand Trunk tracks from Toronto to a point near Hamilton and then pass over the new link to the Toronto, Hamilton & Buffalo road and the Vanderbilt lines to New York. A bill has been presented to the Canadian Parliament providing for the lease to this company of the St. Catherines & Niagara Central, and authorizing the construction of a line joining these two roads. If carried out, this would give the Canadian Pacific Railway direct access to Niagara.

West Virginia & Pittsburg.—It is announced that during the coming winter and spring the road will be opened to Webster Springs, near Addison, W. Va., and that a company, headed by George M. Whitescaroir and Meyer Newburger, the latter President Camden's Secretary, will build a summer hotel, to be opened by June 1.

Electric Railroad Construction.

Benton Harbor, Mich.—We are informed that it is proposed to build an electric road from Benton Harbor to Decatur Pawpaw and Allegan by the Benton Harbor & Eastern Electric Railway Co. The surveys have been made from Benton Harbor to Decatur, and it is expected that the grading of the line will be completed during the winter.

Braddock, Pa.—At a special meeting held Nov. 11, the Braddock Council declared the right of way granted to the Braddock Electric Railway Co. forfeited. The company has lines along Talbot avenue, but has not operated them for 16 months. The company can recover its privilege by the payment of $5,000 into the borough treasury. The ordinance granting the right of way to the Braddock & Homestead Street Railway Co. was amended, so as to allow it the same privileges as given to the Braddock Electric Railway Co. upon the payment of $5,000.

Bristol, Pa.—The Langhorn & Bristol electric road is now constructed from Langhorn to Bristol Borough limits, except through Hulmeville.

Brockton, Mass.—At a meeting of citizens held at East Bridgewater, Nov. 7, to further the matter of building an electric railroad from East Bridgewater to Brockton, a committee of five was appointed to solicit subscriptions and to report at a future meeting. It is stated that sufficient funds have already been pledged to warrant the carrying out of the undertaking.

Catskill, N. Y.—The State Railroad Commission has refused to grant the application of the Catskill, Cairo & Windham Street Railroad Co., mentioned among our notes of March 13, on the ground that the proposed road for its entire length parallels the Catskill Mountain railroad.

Chicago, Ill.—The ordinance granting a franchise to the West Chicago Street Railroad Co between Fifty-fourth street and Grand avenue to Central avenue was amended by the Council, Oct. 9, so that the rate of fare should not be more than five cents for the continuous ride and that the company pay to the city five per cent. of its gross earnings.

The Chicago & Desplaines Valley Street Railway Co. has been incorporated with a capital stock of $100,000 Among the incorporators are Frank Lehman and Robert B. Williams.

Cleveland, O.—The Mayor has vetoed the ordinance granting the Cleveland Electric Railroad Co. permission to construct and operate an extension of its road in Burton street and Rhodes avenue for three reasons, namely: The exclusion of all conditions in reference to the Murray Hill rights; the failure of all provisions for a trackage tax, and the refusal of the Council to accept provisions for universal transfers or reduced fares for this section. It will be remembered that the council passed the ordinance about the last of September, reference to which was made among our notes Oct. 2.

Fayetteville, Ark.—The Fayetteville Electric Railway Co. has been incorporated with a capital stock of of $50,000, and, it is stated, will begin to build an electric line in Fayetteville within a short time. The President is J. A. Griffin; Vice-President, O. M. Wallace; Secretary and Treasurer, J. W. Lipsey.

Hagerstown, Md.—The Hagerstown Electric Railroad Co. is making active preparations to extend the road to the Crawford Bicycle Works, in what is known as Corbett's Addition. The extension will be about 2,000 ft. long. In the spring the company expect to build the Funkstown extension, which will be about a mile long.

Hellertown, Pa.—The Town Council of Hellertown, Northampton County, has appointed a committee to confer with the South Bethlehem town council relative to the early extension of the electric line from South Bethlehem to Hellertown. There will be no difficulty over right of way.

Milwaukee, Wis.—Work will soon be resumed on the Milwaukee & Waukesha electric road. The Board of Public Works insists that a 91 lb. 7 in. groove rail shall be used. See *Railroad Gazette*, pages 480 and 678.

Montreal, Can.—The first trial trip was made, Nov. 3, over the first section of the new Bout de l'Isle electric railroad between Masonneuve and Pointe Aux Trembles. Construction work was begun on the road through La Salle avenue on Nov. 4 and will be completed before long. For further particulars refer to our issue of Nov. 6.

The Montreal Street Railway Co. has extended its tracks from the G. T. R. crossing at St. Henri, on Notre Dame street, to Cote St. Paul locks, a distance of about a mile.

Newton, Mass.—Press reports state that the Newton & Boston Street Railway Co. has decided to extend its road to Great Plain avenue, Needham, at once, providing a franchise can be secured.

Niagara Falls, N. Y.—On Nov. 12 the Niagara Falls Street Railway Co. was granted permission to construct its road in Niagara Falls.

Onondaga Lake, N.Y.—The Onondaga Lake Railroad Co. has been granted permission to construct its road from Syracuse to Onondaga Lake, referred to in our issue of Oct. 9

Ottawa, Ont.—The Ottawa electric railroad has commenced work on the proposed extension of its tracks from the Chaudiere through the E. B. Eddy company's yards, for the purpose of handling the freight of this company.

Parkersburg, W. Va.—At a meeting of the City Council, held last Thursday, an ordinance was passed extending for six months the time in which work must be begun by the Park City Street Railway Co., in the matter of changing from horse power to electricity. The ordinance further permits the use of T-rails on certain parts of the road, with proper planking. The company is now backed by Wheeling capital, and it is intended to push the work of construction.

Peoria, Ill.—A petition was presented to the Mayor and City Council, on Tuesday of this week, by the Glen Oak & Prospect Heights Railway Co, for the right to build an electric road on some of the principal streets in Peoria. This petition appears to be a modification of the ordinance granted to the railroad company in September last and referred to among our notes, Sept. 25 and Oct. 9.

Pittsburgh, Pa.—On Nov. 9 electricity took the place of the cable on the East Liberty branch of the Penn avenue line.

At a special meeting held Nov. 19, the Council of Etna borough repealed the ordinance granting a franchise to the Consolidated Traction Co., of Pittsburgh, in so far as it related to the occupancy of Freeport and Bridge streets.

Portland, Me.—E. A. Newman, General Manager of the Portland Railroad Co., informs us that they began the extension of the electric road from Morrill's Corner to Allin's Corner, North Deering, on Nov. 10.

Redlands, Cal.—R. H. Simlie, President of the San Bernardino Mountain electric railroad writes us that C. E. Macpherson, who built the Mt. Lowe mountain road, has made a careful preliminary survey for an electric road from a place near Highlands, on the Southern California road, to a point near Fredalba Park at the summit of the mountain, which is at an elevation of 6,200 ft. The road will be 13½ miles long and ascend the mountain on a 7½ per cent. grade.

San Diego, Cal.—Work began on Nov. 5 on the extension of the San Diego electric railroad in two sections of the city.

Shamokin, Pa.—The route of the electric road from Shamokin to Centralia was mapped out last week. The proposed route via Big Mine Run has been abandoned, and the line will run south from Centralia to a point east of Byrnesville and then over the Reading track, and come into Ninth street, in Centralia, where it will connect with the Schuylkill Traction line.

Engineers are now making surveys for the extension of the Shamokin-Mt. Carmel electric railroad. See *Railroad Gazette* of Nov. 6, page 781, for further information.

Spencer, Mass.—The Warren, Brookfield & Spencer electric road will extend its line to West Warren, a disance of about three miles. The estimated cost is $18,000. The contract provides for an electric plant at West Warren to give extra power.

Springfield, Mass.—The electric road from Springfield to Thompsonville, noted in our issue of March 20, 1896, has been completed.

Syracuse, N. Y.—The Syracuse & Suburban Railroad Co. was granted permission on Nov. 12 to construct an electric road from South Salina street, in Syracuse, to the village of Manlius, a distance of 12 miles.

Victor, Col.—The estimated cost of the Colorado Springs, Victor & Cripple Creek Railroad, mentioned among our notes on Oct. 23 and Nov. 13, is said to be $300,000. Major More, one of the directors, has stated that the route of the new line is by Crystal Park and Seven Lakes, and that ultimately the road will be extended so as to be 30 miles in length. A portion of the line was graded in 1886.

West Springfield, Mass.—On Nov. 7, the Tatham line of the Springfield Street Railroad Co. was opened from West Springfield to Tatham, a distance of about two miles.

White Plains, N. Y.—A large force of workmen are being engaged in grading the roadbed at the Elmsford end of the electric road, which is being extended. The grading has advanced to within a short distance of Glenville.

Wilmington, Del.—One of our correspondents informs us that Contractor Hugh E. Culley, of Allentown, has completed the construction of the electric line from Wilmington to New Castle, 6½ miles, with the exception of the erection of a bridge over the Philadelphia, Wilmington & Baltimore railroad, which is now approaching completion.

Worcester, Mass.—The Selectmen of Shrewsbury have voted to grant a franchise to what is known as the New Worcester & Clinton Street railroad, the capital stock of which is $150,000, to build a road from the city limit of Worcester to the Boyestown line, a distance of about a mile. Among the temporary directors are: A. S. Paton, C. E. Dresser and W. R. Dame.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—By an agreement entered into at Topeka, the receivership matter in Kansas is to be determined in the Federal Court before Judge Foster, at Topeka, Nov. 23, on the following points: (1.) As to the constitutionality of the Kansas alien law as applied to railway companies. (2.) As to the constitutionality of the law as applied to alien landowners generally. (3.) As to the question whether the law was ever legally enacted by the Legislature.

Baltimore & Ohio.—The annual report, for the year ending June 30, 1896, was read at the stockholders' meeting at Baltimore Nov. 16. The report is similar to the regular annual statements, and covers the operations of the entire fiscal year, both prior and subsequent to the receivership. The total earnings for the year were $23,944,781, an increase over the preceding year of $1,127,599. The operating expenses are divided as follows: General expenses, $1,711,200; conducting transportation, $9,939,966; maintenance of equipment, $3,013,204; maintenance of way and structures, $2,919,049; total, $17,583,420. The increass in the operating expenses is divided as follows: General expenses, $66,816; conducting transportation, $722 955; maintenance of equipment, $920,488; maintenance of way of way and structures, $72,816; total increase of operating expenses, $1,782,376.

The increase in the gross earnings was $1,227,609.80 from freight, $266,846 from passengers, $20,702 from mail, and $1,630.05 from express. The miscellaneous gross earnings decreased $389,188.

It is a matter of congratulation, the report says, that, in spite of the condition of business that existed during the year, the road shows such a comfortable increase in gross earnings. But for the fact that there was a large increase in the maintenance of equipment expenses, amounting to almost $1,000,000, the net earnings would have compared very favorably with those of the best of the preceding years in the history of the company. As it was, the net earnings amounted to $7,330,359, and the decrease amounted to a little less than the increase in the operating expenses. From these net earnings are deducted the interest on bonded indebtedness, rentals, taxes and other charges to the amount of $7,202,854. The real fixed charges of the property were earned. Payments amounting to $694,834 have been made to retire bonded and other indebtedness.

The application of the Receivers to the Court for authority to issue $650,000 additional Receivers' certificates will come up for hearing before United States Circuit Judge Goff to-day, Nov. 20. The proceeds of the certificates are to be used for the improvements of the Pittsburgh & Connellsville road. Some of the improvements and their estimated cost is as follows: Terminals at Pittsburgh, $320,700 additional second and third tracks and sidings, $143,800; new yard at Connellsville, with five miles of yard track, $30,000; relocation and construction of line between Foley's Siding and Fairhope Bridge, to avoid Fall's cut, $100,000; new steel bridges, $60,000: arching tunnel, $30,000; reconstruction of roadway between Connellsville and Pittsburg, $53,000 The total estimated cost of the improvements is $750,000. They are in addition to the ordinary repairs and renewals, for which a much larger sum will be expended this year than would ordinarily be required.

Chicago & Northern Pacific.—All the franchises and all the real and personal property of the road was sold at auction at Chicago, Nov. 17, for $8,000,000. The sale was under the judgment issued by the United States Circuit Court, June 20, 1896, and was made to William Allen Butler, on behalf of the bondholders' committee, J. Edward Simmons, Henry Budge, Robert Martin, Simon Sterne, William Mertens, A. S. Heidelbach and himself. Mr. Butler was the only bidder Plans of reorganization have not yet been decided.

Chicago Junction Railways & Union Stock Yards.—The company reports earnings for the year ending June 30 as follows:

	1896.	1895.	Inc. or dec.
Gross earn	$3,442,264	$3,354,559	I. $87,705
Oper. expen	1,361,831	1,251,413	I. 110,418
Net earn	$2,080,433	$2,103,146	$22,713

Cœur d'Alene Railway & Navigation Co.—This road, one of the branch lines of the Northern Pacific in Idaho and Washington, is to be sold at foreclosure, by order of the United States Court, for default in interest. The bonds amount to $1,500,000. The road is the Northern Pacific's branch line into the Cœur d'Alene Mountains in Idaho. The line leaves the main line of the Northern Pacific at Hauser Junction, Idaho, and extends to Cœur d'Alene City. There it connects with steamers running on Cœur d'Alene lake and river to the Old Mission. At the Mission connection is again made with a narrow-gage railroad running into the mining towns of the Cœur d'Alenes. The company was organized and its lines constructed by D. C. Corbin, President of the Spokane & Northern. He began construction of the line from Hauser Junction to the lake, 14 miles, in 1886, and completed it the following year. In 1888 he pushed work on the narrow gage from the Mission to the mines, 35 miles, and completed it late that year. Shortly after, the line was leased by the Northern Pacific. The new Northern Pacific declined to take over the lease, but will probably purchase the property at foreclosure.

Delaware, Lackawanna & Western.—The Board of Trade of Paterson, N. J., has been discussing plans for securing the line of this company into that town and has had some correspondence with President Sloan, but they seem to have made no further progress and to have secured a cautious reply from him that the directors would consider the proposition.

Erie.—Earnings for the quarter ending September 30 were:

	1896	1895.	1894.
Gross earn	$7,485,296	$7,265,790	$6,69-,291
Oper. expen	4,859,579	5 046.450	4,485,797
Net earn	$2,615.717	$2,219,310	$2,206,494
Total income	2,627.766	2,260,972	2,259,339
Fixed charges	2,155,734	2,273,034	2,461,589
Surplus	$472,032	Def. $12,062	Def. $202,250

Illinois Central.—The earnings for the three months ended Sept. 30 are as follows:

	1896.	1895.	Inc. or dec.
Miles oper	3,1 7	2 888	I. 239
Gross earn	$5,220,840	$4,877,814	I. $343,026
Oper. exp. and taxes	3,890,134	3,453,846	I. 466,288
Net earn	$1,330,706	$1,453,968	D. $123,262

The gross receipts from traffic for the month of Octo-

ber, 1896 (3,127 miles), are estimated at $2,246,767; the receipts for October, 1895 (3,127 miles), were $2,387,442, the estimated decrease on the same mileage being $140 675.

Macon & Birmingham.—A mortgage for $500,000 to the Old Colony Trust Co., of Boston, Mass., was filed by the company in Georgia last week. The road is now in operation from Macon to La Grange, Ga., 97 miles. The road was sold by decree of court last summer, and bought by representatives of Boston interests. The bonds were issued to raise money to pay for the purchase of the road and right of way over the projected route from La Grange to Birmingham, Ala.

Its completion will connect Birmingham with the coast, via Macon and Savannah, which is the ultimate object.

New York, New Haven & Hartford.—The earnings for the quarter ending Sept. 30 were:

	1896.	1895.	Inc. or dec.
Gross earn	$7,892,932	$8,322,256	D. $429,324
Oper. expen	5,070,511	5,023,953	I. 46,558
Net earn	$2,822,421	$3,298,303	D. $475,882
Other income	110,025	63,545	I. 46,480
Total income	$2,932,446	$3,361,848	D. $429,402
Fixed charges	1,563 671	1,573,334	D. 9,663
Surplus	$1,368,775	$1,788,514	D. $419,739

Norfolk & Western.—The Scioto Valley Division of the road, 131 miles long, was sold at Portsmouth, O., Nov. 11, to the reorganization committee of bondholders for $110,000, the purchasers assuming a mortgage indebtedness of over $5,000,000.

Northern Pacific.—In the United States Court at Milwaukee, Judge Jenkins entered an order on Nov. 17 discharging Frank C. Bigelow and Edwin H. McHenry as receivers for the railroad in the consolidated action. The order, however, does not terminate the receivership or the offices of Messrs. Bigelow and McHenry as receivers, for the present order does not affect their appointment under a supplemental suit. The receivers are required to furnish new bonds of $50,000 each within 10 days. The order does not remove the property from the jurisdiction of the court. The court reserves the right to at any time retake and resell the property for the purpose of satisfying any indebtedness or liability of the receivership. The order contained no mention of the compensation which the discharged receivers are to receive.

Philadelphia & Reading.—The company was formally reorganized on Nov. 17 by the election of a President, a Secretary and six Directors. Under the plan of reorganization there will be three companies, the Philadelphia & Reading Railway Company, the Philadelphia & Reading Coal & Iron Company and the Reading Company. The latter is known as the National Company, but an application has been filed in court to have the title changed. This latter company, which was the parent organization of the Philadelphia & Reading Railroad Company, will have supervision and control of the other corporation. These officers were elected: President, Joseph S. Harris; Secretary, William R. Taylor; Directors, George F. Baer, of Reading; Charles H. Coster and Francis Lynde Stetson, of New York, and George C. Thomas, Thomas McKean and John Lowber Welsh, of Philadelphia. The officers elected will serve until May, 1897.

Richmond & Danville.—A suit of the Carnegie Steel Co. against this road was decided on Nov. 17, in the United States Circuit Court of Appeals, at Richmond, Va., in favor of the plaintiffs. Judgment was given for $164,000. The claim was for rails furnished the road about one year before the appointment of the receivers. The order of appointment only authorized the receivers to pay supply claims incurred within four months, but the Carnegie Co. contended that the income of the road, in an amount greater than their claim for the rails, had been diverted to pay coupons of first mortgage bonds, and, therefore, that it had an equitable lien upon the railroad prior to the mortgage.

Seaboard & Roanoke.—It was announced on Wednesday of this week that the proposed sale of the majority interest in the stock to Mr Thomas F. Ryan and his associates in New York City has fallen through, the syndicate having failed to secure the assent of the necessary two-thirds of the stock held in the trust formed some months ago on the advice of President Hoffman. This trust or committee had secured the deposit of 8,321 shares of the stock, and President Hoffman, who has not been in favor of the sale of the securities to the New York interest, stated this week that less than one-half of the holders of the shares held in the pool had assented to the proposed sale and that therefore the negotiations would be suspended. President Hoffman in his statement referred to the vote of the stockholders not to sell as gratifying evidence to him of the confidence of the security-holders in the management and in the future of the property. He emphasized the importance of having an independent line to the South, and thought that the appreciation of this fact and the fear that the road under its new control would be identified with the Southern railroad interests had influenced the vote of the stockholders. He states that in the first three months of the current fiscal year large net gains were reported over the corresponding months of 1895.

The present movement, which thus ends in an unexpected manner, began some months ago when General Gill, President of the Mercantile Trust Co., of Baltimore, attempted to secure the deposit with his company of enough stock to control the property. He secured the deposit of something over 2,000 shares, and this stock was purchased by Mr. Ryan and his associates for par. The friends of President Hoffman, as stated above, were, however, able to secure deposits of over 8,000 shares of stock, and for this stock Mr. Ryan agreed to pay something like $125 a share. It was necessary to secure more than an absolute majority of the total outstanding stock to obtain control on account of a clause in the charter of the company, which provided for a sliding scale of voting, holders of large lots of securities not having the right to have each share counted for one vote.

Terre Haute & Indianapolis.—Volney T. Malott, of Indianapolis, was last week appointed Receiver by Judge Woods, of the United States Court, in the suit brought by J. A. Blair, M. T. Cox and others of the New York Bondholders Committee.

Union Pacific.—The September earnings are reported as follows:

	1896.	1895.	1894.
Gross earn	$2,186,045	$2,137,624	$2,248,063
Oper. expen	1,410,991	1,256,996	1,438,296
Net earn	$775,054	$880,628	$809,767
P. c. expen. to earn	64⅛	58⅞	64
Gross 9 mos	16,261,608	15,769,321	16,906,296
Net 9 mos	5,672,933	5,474,671	4,577,066

Electric Railroad News.

Boston, Mass.—The West End Street Railway Co. reports as follows for the year ending Sept. 30:

	1896.	1895.	Inc. or dec.
Gross earn	$8,341,958	$7,746,170	I. $595,788
Oper. exp	6,334,619	5,633,163	I. 701,456
Net earn	$2,057,339	$2.113.007	D. $105,668
Fixed charges	794,601	746,964	I. 47,637
Dividends	$1,147,950	$1,102.525	I. $45,425
Surplus	$64,789	$263,519	D. $198,730

The general balance sheet shows:

Cash on hand	$610,361	$1,192,151	D. $581,790
Total assets	26,395,628	25,568,458	I. 827,170

Chicago.—On Nov. 15 the West Chicago Street Railway Co. filed for record a consolidated mortgage for $10,000,000 in favor of the Central Trust Co., of New York. The bonds run for 40 years and bear five per cent. interest.

The suburban lines of the Chicago & Northern Pacific have been leased to the Suburban Railroad Co., of Chicago.

Hartford, Conn.—On Nov. 12, the Hartford Street Railway Co, the Newington Tramway Co. and the Central Railway & Electric Co., of New Britain, filed in the Hartford Superior Court their appeal to the Supreme Court from Judge Wheeler's decision against them in the suit brought by the New England Railroad to prevent these companies building an electric line to New Britain, as mentioned among our news notes last week.

Owosso, Mich.—The Caledonia Electric Light & Power Co. has been purchased by the Owosso & Corunna Traction Co. There will be no extensions of the road at present.

Pittsburgh, Pa.—The stockholders of the Pittsburgh, Allegheny & Manchester Traction Co. will hold a meeting on Nov. 30 to vote on a proposition to lease its property to the North Side Traction Co.

TRAFFIC.

Traffic Notes.

The Philadelphia & Reading has put on a fast freight train, known as No. 57, between New York and Williamsport, Pa. It runs through in about 12 hours.

A large number of valuable horses have recently been sent from Chicago to New Orleans by express. On one day last week 10 carloads arrived at New Orleans on one train.

The Merchants' Warehouse Co. is the name of a corporation organized in Iowa to build grain warehouses on the line of the Chicago Great Western. President Stickney of that road is one of the incorporators.

The Ann Arbor Railway will put on two large steamers between the Kewanee and Manitowoc, in addition to the vessels now running between those ports. The company expects to get a heavy winter business from the West.

The National Grain Dealers' Association has been formed at Chicago. Its constitution is not yet published but one report states that the object of the grain men is "to fight the railroads." Another says that they are to seek the passage of reform legislation.

The Western Pass Agreement, in which the Southwestern, as well as the Western roads co-operate, has been renewed for another year. Section 8 has been changed so as to prohibit the exchange of annual passes with roads less than 50 miles long. Hitherto the minimum limit has been 25 miles.

The Georgia State Railroad Commission has received various complaints against railroad companies for secret rate-cutting, especially on cotton. The railroad companies have been ordered to produce their records, but the officials deny the jurisdiction of the Commission over the shipments which the complaints referred to.

At Birmingham, Ala., Nov. 13, the Interstate Commerce Commission filed a suit in the United States Court against the Southern Railway and its connections, to enforce an order of the Commission requiring the roads to cease violating the long and short haul law on freight shipments from eastern cities to Anniston and Piedmont

The principal railroads of the Ohio soft coal district met in New York last week and agreed to restore freight rates on coal in Ohio at once and on interstate coal business Nov. 24. The roads represented were the Columbus, Hocking Valley & Toledo, the Pennsylvania, the Wheeling & Lake Erie, the Baltimore & Ohio, the Columbus, Sandusky & Hocking, the Cleveland, Lorain & Wheeling, and the Toledo & Ohio Central.

The Mississippi Railroad Commissioners have decided to order the railroad companies doing business in the state to reduce their freight rates about 20 per cent. It seems that their intention was to order a reduction of about 40 per cent., but the protests of the roads caused them to modify the order. It is said that the tariffs for all the roads, except the Illinois Central, have already been fixed, and the officers of the Illinois Central are summoned to meet the Commissioners at their December meeting.

In consequence of the activity in the wheat market and the probability of a large flour traffic, the approach of the close of navigation on the Lakes finds a large number of freight men at Minneapolis; and one of the newspapers of that city states that bids for European flour shipments are made by such roundabout routes as those by way of Mobile, Ala.; Galveston, Tex., and Pensacola, Fla. The Cleveland, Cincinnati, Chicago & St. Louis expects to take a good deal of freight from the Northwest by boat from Chicago to Benton Harbor, and thence over its own line, and that of the Chesapeake & Ohio, to Newport News.

It was announced last week that the United States Shipping Company would put on a semi-monthly line of steamers between Newport News, Va., and Manchester, England, rates to be the same as to Liverpool. This was followed the next day by the announcement that William Johnston & Co., the firm which has established an English steamship line from Charleston and other Southern ports, will also run steamers direct to Manchester. According to the statements made, these vessels will take freight at nearly all the principal South Atlantic ports, Baltimore, Newport News, Charleston, Savannah and Brunswick.

The Rate Committee of the Southwestern Freight Association has been organized and it began its work last week. This committee will have a representative from the freight department of each road in the Association. Some of the roads had complained that the Board of Administration, which at first made changes in rates, took too radical and summary action without sufficient consultation with different interests. This complaint, made much of by the local papers, seems, however, to have been readily adjusted, and we understand from officers of prominent roads interested, that the association is doing highly successful work.

The Switching Charge at the Union Stock Yards.

The Supreme Court of the United States has denied the application for a writ of certiorari to take to that court the record of the Circuit Court of Appeals in the suit against the receivers of the Atchison, Topeka & Santa Fe involving the validity of the $2 switching charge at the Union Stock Yards, Chicago. The decision of the lower court was reported in the *Railroad Gazette*, May 15, 1896. In other words, the Supreme Court has decided that the case is not one of such gravity and importance as to require a reconsideration by the Supreme Court. This ends the litigation, and the legality of the $2 charge is sustained.

Southern Freight Rates from Chicago.

Judge Sage, in the United States Court at Cincinnati, has handed down an opinion in which he refuses to sustain the Interstate Commerce Commission in ordering a reduction of freight rates on Chicago shipments from points on the Ohio River southward. It will be remembered that the Commission's decision, reported in the *Railroad Gazette* of June 29, 1894, held that the rates made by the roads from Cincinnati and Louisville southward, on Chicago freight, were too high as compared with the rates charged by the same roads on shipments from New York and Eastern points. The latter rates have to be made low enough to compete with lines from New York by water to Norfolk and other Southern ports, and the differences between these and the rates from Chicago were based on an agreement made in 1878; the Commission held that this agreement was contrary to the Interstate Commerce Law, and therefore should have been abandoned when that law went into effect in 1887.

We have not received a full copy of Judge Sage's decision, but a syllabus, printed in the daily papers, says:

The right to prescribe maximum rates for the transportation of freight is the right to dictate an indispensable and one of the most important terms of the contract between the carrier and the shipper.

As a legislative right it has been so long and so generally recognized as to be beyond question, and it results from the corporate existence of the common carrier, or from his quasi-public relation to any and all who may come to him as freighters or passengers.

It can hardly be said to be within the recognized limits of the exercise of judicial right or power, because, while a court of equity may enforce specific performance of a contract or correct mutual mistakes in it, it never makes a contract.

The Interstate Commerce Commission is not invested and cannot be invested, under the constitution, with either legislative power or purely judicial power. Its functions are necessarily restricted to the performance of administrative duties, with such quasi-judicial powers as are incidental and necessary to the proper performance of those duties.

It is not an incidental right. It is not a right or power to be derived by implication or construction from general phrases in the first or other sections of the act to regulate commerce, nor can it be imported into the act by reference to or by reason of the necessities of the case. If found at all, it must be found in express and special language, among the powers and rights granted in direct terms, and there is no such language in the act.

The power of the Commission to fix rates has been denied by the Supreme Court in the Social Circle case.

Subject to the two leading prohibitions that their charges shall not be unjust or unreasonable, and that they shall not unjustly discriminate, so as to give undue preferance or disadvantage to persons or traffic similarly circumstanced, the act to regulate commerce leaves common carriers as they were at the common law, free to make special contracts looking to the increase of their business, to classify their traffic, to adjust and apportion their rates so as to meet the necessities of commerce, and generally to manage their important interests upon the same principles which are regarded as sound and adopted in other trades and pursuits.

Chicago Traffic Matters.

CHICAGO, Nov. 18, 1896.

The new Western Freight Association is now in perfect working order, and it is said that freight rates from now on will be maintained on a reasonable basis and the same figures quoted to all shippers.*

There has been a little stir among eastbound officials over a report that private stock car companies have been allowing mileage to shippers. The chairman of the Central Freight Committee is now investigating the matter.

General Passenger Agent Ford, of the Pennsylvania Lines, favors the issuance of a 5,000-mile interchangeable ticket, to be sold at $100, to be issued by the Chairman of the Central Passenger Committee and good over all lines in the association. A meeting to consider the question will be held in this city to-morrow. In the meantime, the Louisville, New Albany & Chicago has issued a mileage ticket good over 15 roads in Central Passenger Committee territory. It is probable that the Central Passenger Committee will vote to issue a 5,000-mile interchangeable ticket.

Total shipments to the east by lake last week, were 90,821 tons, of which 84,551 tons were grain. The all-rail traffic amounted to 74,464, against 68,694 tons for the preceding week, an increase of 5,770 tons, and compared with 76,444 tons for the corresponding week of last year. The all-rail traffic was carried as follows:

Roads.	Week to Nov. 14.		Week to Nov. 7.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central	8,107	10 9	7,799	11 3
Wabash	6,880	9 2	5,565	8.4
L. S. & M. S.	11.560	15 5	9,406	13.7
Pitts., Ft. Wayne & Chicago	6,949	9.3	5,708	8.6
Pitts., Cin., Chi. & St. Louis.	7,916	10.6	7,525	10.7
Baltimore & Ohio	8,818	11.9	9.045	13.2
Grand Trunk	8,211	11.0	6,882	10.0
N. Y. C. & St. L.	6,857	9.2	6,602	9.6
Erie	5.105	6.9	6,275	9.1
C., C., C. & St. Louis	4,059	5.5	3,887	5.7
Totals	74,464	100.0	68,694	100.0

Of the above shipments 2,620 tons were flour, 40,714 tons grain, 12,712 tons provisions, 8,474 dressed beef, 1,530 tons butter, and lumber, 3,939.

* The new agreement will be found on a preceding page.—EDITOR.